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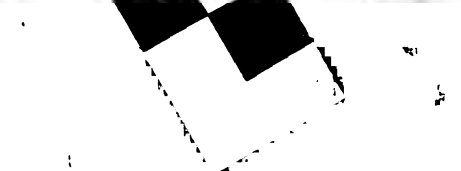
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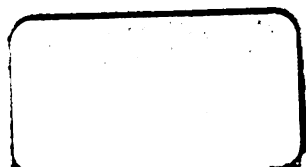
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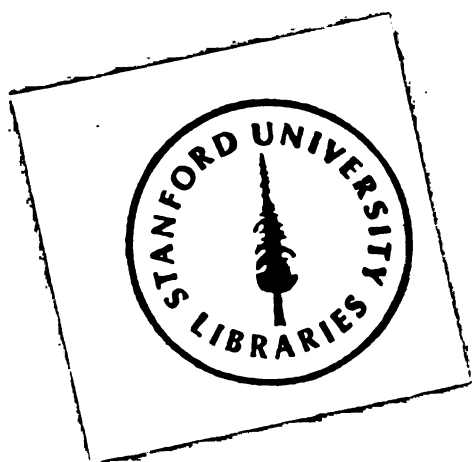
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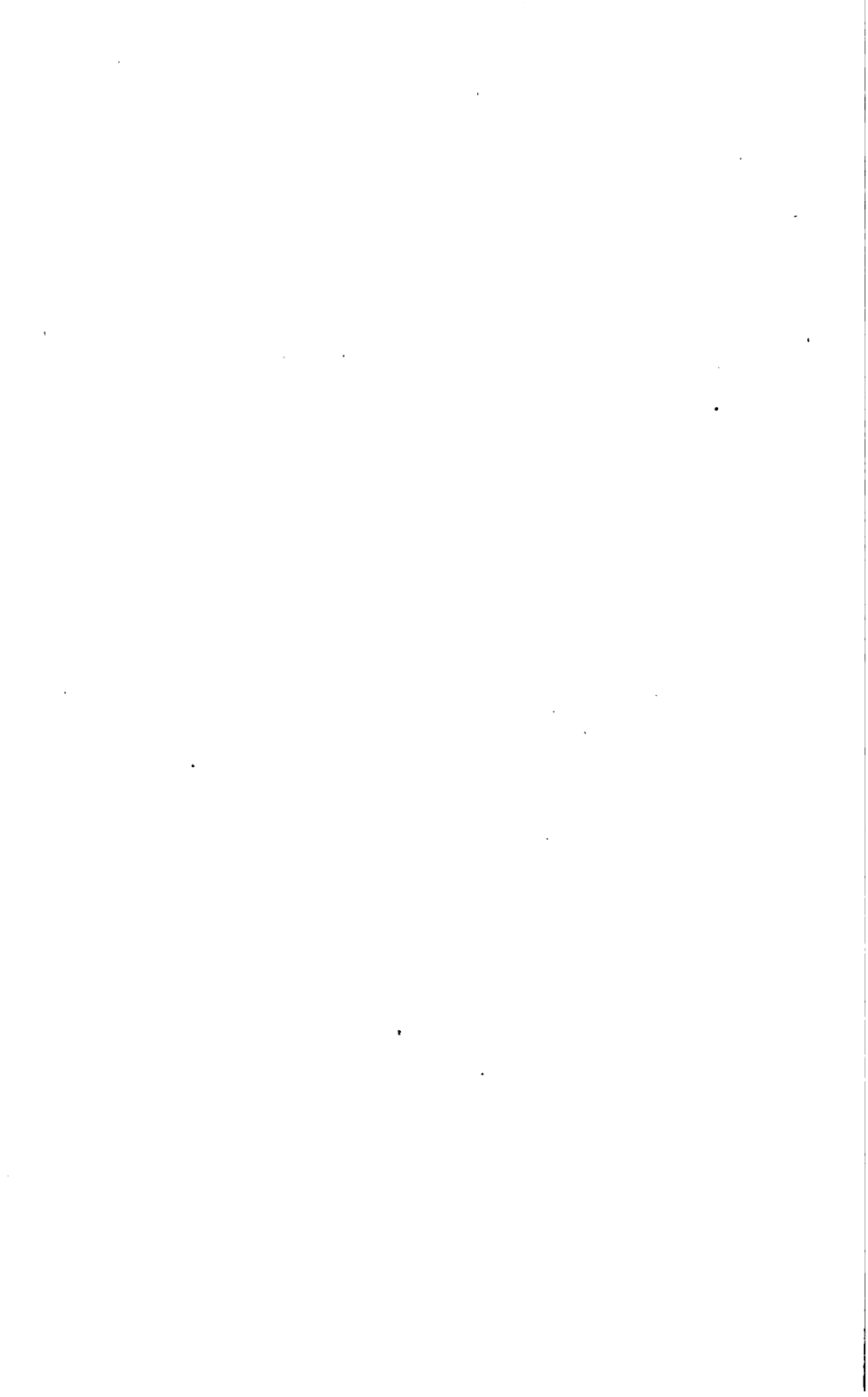
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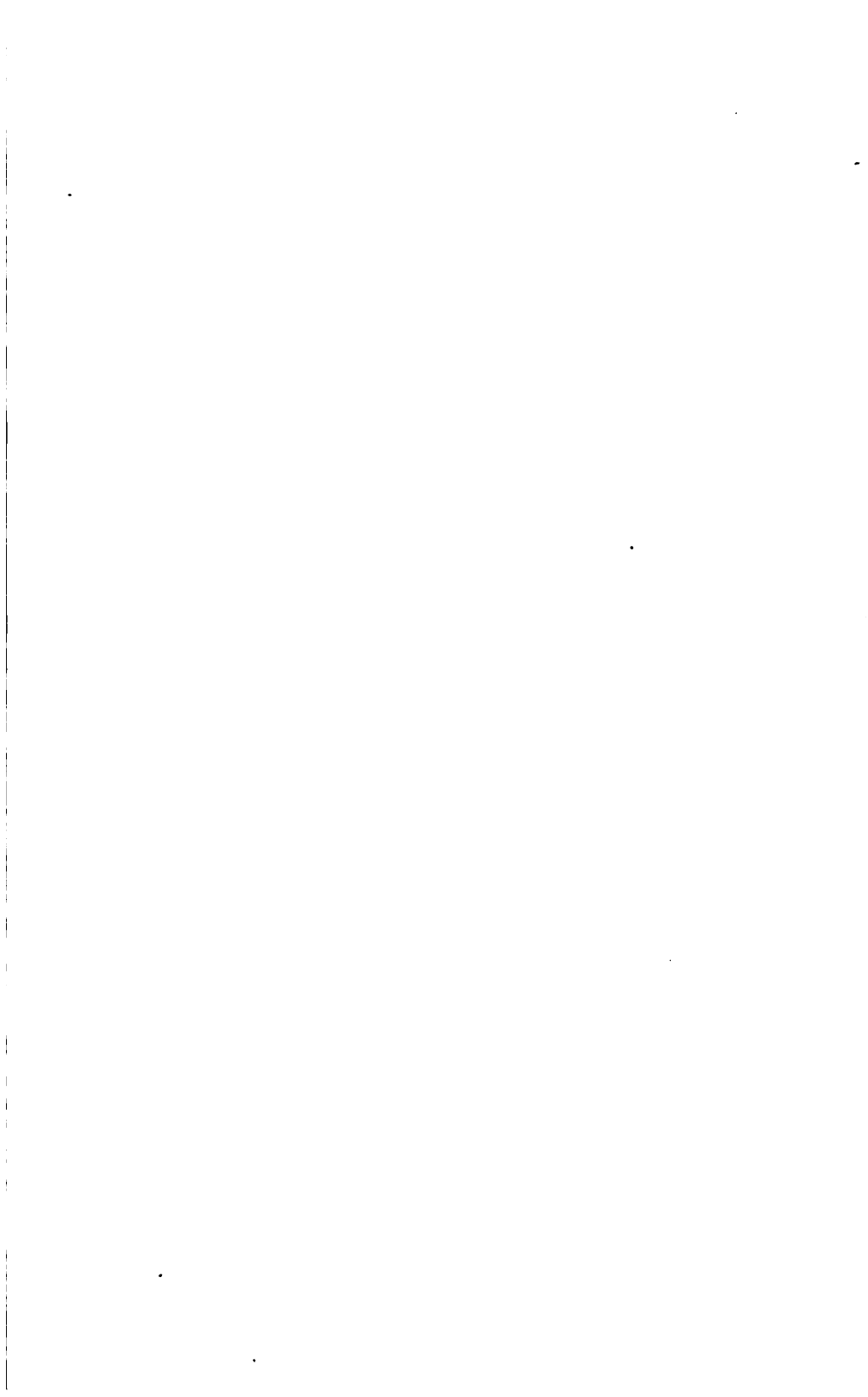
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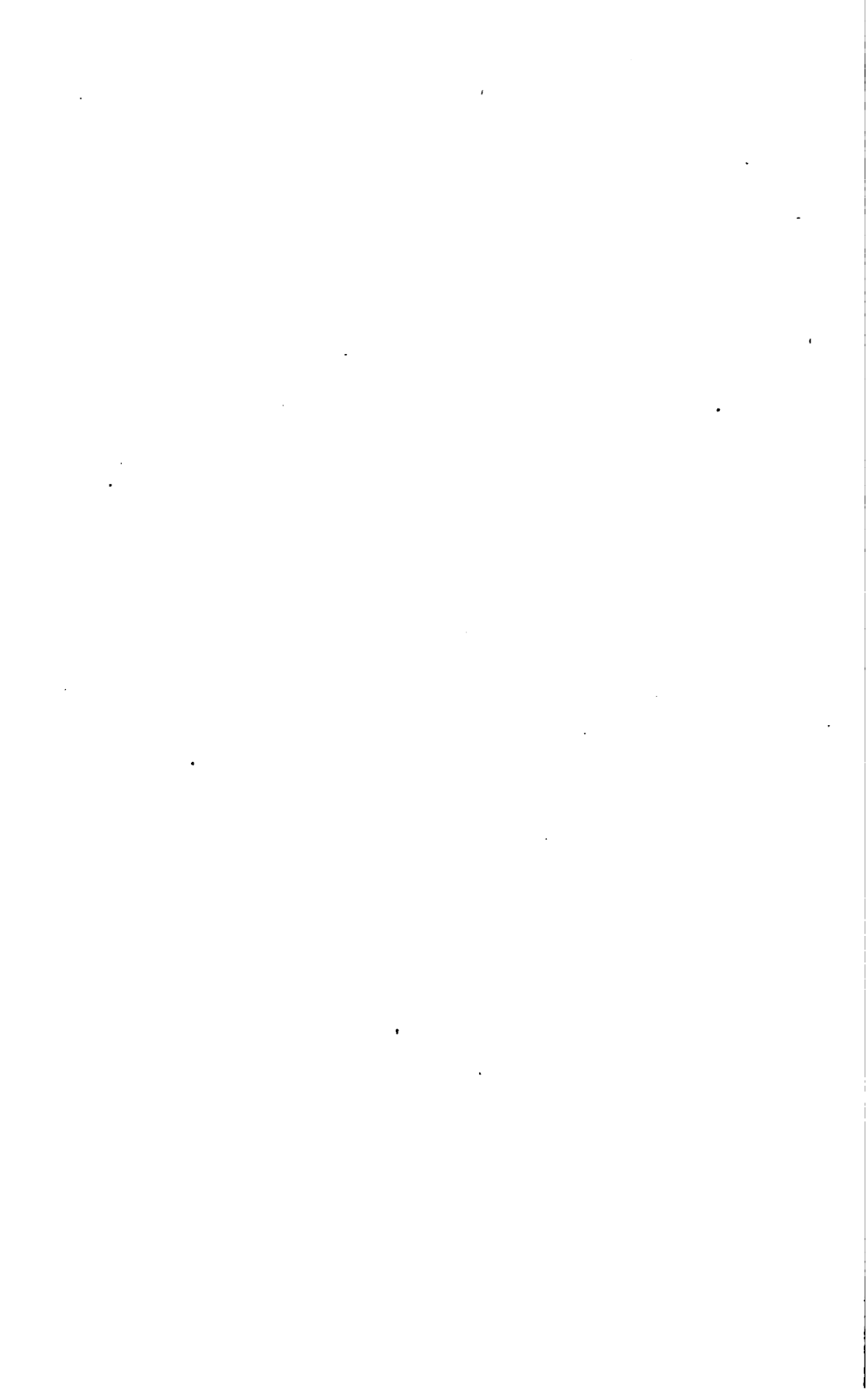














10017-5-0307

THIRTEENTH BIENNIAL REPORT

OF THE

STATE BOARD OF HEALTH

OF

CALIFORNIA,

FOR THE FISCAL YEARS FROM JUNE 30, 1892, TO JUNE 30, 1894.

ALSO,

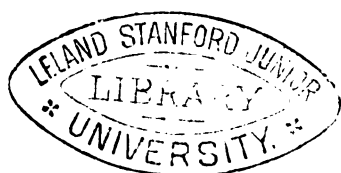
THE TRANSACTIONS OF THE SECOND ANNUAL SANITARY CONVENTION,
HELD AT SAN JOSÉ, APRIL 16, 1894.



SACRAMENTO:

STATE OFFICE, : : : : A. J. JOHNSTON, SUPT. STATE PRINTING.

1894.



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OFFICE CALIFORNIA STATE BOARD OF HEALTH, }
SACRAMENTO, September 3, 1894. }

To his Excellency H. H. MARKHAM, Governor of California:

SIR: I have the honor to present to you, in compliance with the laws of the State, the thirteenth Biennial Report of the State Board of Health, for the fiscal year from June 30, 1892, to June 30, 1893, and from June 30, 1893, to June 30, 1894. Also, the proceedings of and papers read at the Second Annual Sanitary Convention, held April 16, 1894, at San José.

Very respectfully,

J. R. LAINE,
Secretary State Board of Health.

MEMBERS OF THE CALIFORNIA STATE BOARD OF HEALTH.

C. A. RUGGLES, M.D.	Stockton.
J. R. LAINE, M.D.	Sacramento.
W. F. WIARD, M.D.	Sacramento.
C. W. NUTTING, M.D.	Etna Mills.
P. C. REMONDINO, M.D.	San Diego.
J. H. DAVISSON, M.D.	Los Angeles.
WINSLOW ANDERSON, M.D.	San Francisco.

OFFICERS OF THE BOARD.

C. A. RUGGLES, M.D.	President.
J. R. LAINE, M.D.	Secretary.

GENERAL REPORT OF THE BOARD.

To his Excellency H. H. MARKHAM, Governor of California:

SIR: Agreeable to an Act establishing a State Board of Health and defining its powers, the thirteenth Biennial Report of the State Board of Health is hereby submitted; also the transactions of, and papers read at, the Second Annual Sanitary Convention held April 16, 1894, at San José.

Soon after the submission of the twelfth Biennial Report it became necessary to send a sanitary inspector to the northern line of the State to guard against smallpox, which prevailed among the population on Puget Sound. A little later grave fears were entertained lest cholera, which prevailed quite extensively in European countries, should effect a landing on the Atlantic shores of this continent and spread among our people. It was deemed advisable, in view of the feverish condition of the public mind, filled with justifiable apprehensions, to place inspectors at or near Truckee, Needles, and Yuma. Hospitals tents were procured and sent to the two last named points, to be used in case it became necessary to detain passengers.

The quarantine detention at New York harbor had, however, been very thorough, and passengers from that point were provided with certificates. In but one instance was it found necessary to detain a passenger train, which occurred on the desert west of Yuma, and for a few hours only. The same precautions were taken in 1893, when cholera again reached New York harbor.

The Board, speaking in behalf of the people of the State of California, express their thanks for your Excellency's recommendation to the Legislature for the appropriation of \$50,000 to be used to prevent the entrance of contagious diseases into the State, and also to the honorable Legislature for their wisdom in carrying out the recommendation.

There is ample reason for the statement that the whole country is now in a better condition to resist an invasion of cholera, or of any other contagious or infectious disease, than at any time during the history of the republic. The preparation for the threatened invasion of the foreign pestilence has had the effect to greatly reduce mortality from local infectious diseases, and this is apparent in a lowering of the death-rate from diphtheria and other contagious diseases, notably in San Francisco and the larger towns throughout the State. As will be seen by the minutes of the Board and from the reports of committees, a careful, and in some instances rigid, inspection of most of the public buildings has been made during the past two years. It has been the policy of the Board to make no strictures on the administration of any institution, confining their observations and reports exclusively to the sanitary arrangements, necessities, and delinquencies, and basing whatever recommendations they have made, upon their personal and official views within their province.

An effort has been made to secure more exact and reliable reports coming under the head of "Vital Statistics," and if a compliance with

the laws of the State can be enforced, a great improvement in this particular will have been attained.

The financial business of the Board will be found in a separate report by the Secretary, as will also tables of mortuary reports, and a detailed statement of the deaths from different causes.

The Board is not prepared to recommend any changes or additions to the laws relating to sanitary matters in the State, believing that a compliance with, and enforcement of those which are now in our statute books will be sufficient for our protection at this time.

We have the honor to be, very respectfully,

C. A. RUGGLES, M.D.

J. R. LAINE, M.D.

W. F. WIARD, M.D.

P. C. REMONDINO, M.D.

C. W. NUTTING, M.D.

WINSLOW ANDERSON, M.D.

J. H. DAVISSON, M.D.

ABSTRACT OF PROCEEDINGS OF THE BOARD, AS SHOWN BY THE MINUTES.

The State Board of Health met in regular session at the office of the Secretary, July 25, 1892.

Present: Dr. C. A. Ruggles and Dr. J. R. Laine.

A letter was read from Dr. Nutting, stating his inability to be present, and a telegram from the President, W. G. Cochran, also stating that he could not be present.

There being no quorum, no business of any official character was transacted; but the matter of placing a Medical Inspector at the northern boundary of the State was determined upon, in case the quarantine of the Puget Sound cities should be raised before the danger from smallpox was certainly past.

The Board then adjourned to meet at the call of the President in San Francisco in August.

AUGUST 15, 1892.

The Legislative Committee of the State and San Francisco Boards of Health, composed of W. G. Cochran, C. A. Ruggles, and J. R. Laine of the State Board, and M. Regensburger and S. F. Long of the San Francisco Board, met at 8 P. M. at the Grand Hotel, San Francisco.

The members of the committee were all present except Dr. S. F. Long.

Some difference of opinion concerning the necessity of legislation was manifested, and a lengthy and general discussion followed with reference to the advisability of establishing a State lazaretto for incurable infectious diseases. The only two diseases coming under that head are leprosy and consumption. Of lepers there are no more than thirty or forty in the State, of whom all but two or three are Chinese. On this meager showing, it was not deemed a matter of sufficient urgency to ask the Legislature to establish a lazaretto for the special care of these few Chinese. Again, it would scarcely do to propose an association of consumptives who are of the Caucasian race, with lepers of the Mongol race in one common lazaretto for the care of those suffering with chronic incurable infectious diseases. This brought the committee to a discussion of a home for incurable consumptives, and of the dangers of infection from germs in phthisical sputa. The opinion finally prevailed that inasmuch as phthisis requires a variety of climate to suit the requirements of different cases, that it was impossible to fix upon a locality which would be advantageous to the greater number. It was urged also that such an institution would induce the indigent consumptives from the whole country to migrate hither, and be maintained at the expense of the State. California has a large death-rate from consumption, due to the migratory habits of this class of incurables, and it was deemed unwise to invite the indigent class also. Aside from consideration of

expense, it was deemed a detriment to the future health of the State to favor the immigration of consumptives to California.

The committee adjourned to meet at the call of the President, W. G. Cochran.

AUGUST 16, 1892.

Drs. W. G. Cochran and J. R. Laine proceeded to Agnews to make a sanitary inspection of the Agnews Insane Asylum.

Dr. C. A. Ruggles resumed his station in the northern part of the State as Inspector for the Board.

The Agnews Asylum is situated on a level stretch of fertile land but little above tide water. The water supply is obtained from an artesian well in the rear of the buildings. The water rises into a covered reservoir, and is pumped directly into the mains. The quality is excellent and the quantity ample and apparently inexhaustible. The closets and lavatories were in a very creditable condition.

The drainage is conveyed from the different parts of the buildings to an eight-inch vitrified stone sewer, through which it flows in a northeasterly direction 3,400 feet, and empties into a creek. This is represented to be a temporary sewer. The sewer is ventilated near the rear of the buildings by a pipe which taps the sewer at its junction with the waste pipes of the premises, and is introduced into a tall smokestack which carries the smoke of the furnaces. The furnace is detached and unconnected from the buildings, and the great draught of the smokestack carried the gases above all possibility of polluting the atmosphere respired by the inhabitants. The asylum is newly built and is modern in construction, and has been maintained in such a manner as not to be deserving of adverse criticism.

The kitchen and dining-hall were scrupulously clean. The kitchen was free from flies; the meats were fresh and the food supplies in the store-room were of good quality. The food prepared for the table at noon was well cooked and to all appearance unobjectionable.

The Board adjourned on the 17th until the next quarterly meeting, but Dr. W. G. Cochran was instructed to remain in San Francisco long enough to confer with the local health authorities, and ascertain what joint measures can be adopted looking to the perfection of general sanitation and local quarantine in case of a visitation by an epidemic of acute contagious disease. He was also instructed to visit the San Quentin Prison and ascertain what has been done towards a compliance with the recommendations of the Board—made at a former visit—and report to the Board. The appointment of Dr. C. A. Ruggles as Medical Inspector, to guard against the introduction of smallpox into the State from British Columbia, was confirmed; and he was directed to return to his station and remain there until all danger from that quarter is passed.

Special meeting of the State Board of Health, September 5, 1892, at 8 o'clock P. M.

The State Board of Health met at the office of the Secretary, J. R. Laine, the full Board being present: W. G. Cochran of Los Angeles (President), W. R. Cluness of Sacramento, P. C. Remondino of San Diego, C. A. Ruggles of Stockton, and C. W. Nutting of Etna Mills.

The Board was thoroughly alive to the necessity of taking immediate action to prevent, if possible, the introduction of cholera into the State, and to use every possible measure to prevent its spread, should it come.

Dr. Cluness, of Sacramento, opened the discussion by saying that while there was a possibility that we would have cholera on this coast, he did not think it was likely that it would be here this year. Even if it got a foothold in New York City, he thought it was so late in the season that its progress would be stayed by frosts, which would at least render the germs of the disease dormant until next summer. While he did not think danger was imminent, something ought to be done in the line of preparation. If we escape the disease this fall, it would be at least possible that it would reach us. He thought the disease had its precursor in diseases at present prevailing among the lower animals, and that the epidemic known as la grippe had prepared our systems for the reception of the germs of cholera. As the grippe prevailed almost universally, the cholera might be expected to prevail generally also. He suggested that the first question was how to prevent it, if possible, and the second was how to deal with it if it became necessary.

Dr. Ruggles stated that he had a bitter experience with the cholera in 1849, and the very name of it made him shudder with apprehension. He had watched its appearance in Europe and had followed its progress closely. He believed the quarantine measures taken on the Atlantic Coast are admirable, and that they were as good as could be taken under the circumstances. The quarantine in the British Possessions, however, he considered almost worthless as a protection, and said he knew the measures taken, if any, at Quebec and Canada points were entirely inadequate. The authorities at Montreal he knew to be careless, and he apprehended that if the cholera reached us it would first come over the Canadian Pacific Railroad. He was in favor of taking immediate steps to post inspectors to examine incoming trains and guard the threatened points. He believed the sentiment of the people demanded that the Board be on the alert and act promptly.

Dr. Remondino said the epidemic la grippe was very severe, and he believed with Dr. Cluness that the cholera would be quite as general. He thought the Board should take measures to impress upon the people that it is at least probable that it will be as universal as the grippe, and urged upon local Boards and health officers the importance of cleaning up everywhere.

Dr. Nutting realized the necessity of action, but had not much faith in land quarantine to stay the progress of cholera. He said, however, it was a good plan to do all we can to take reasonable precaution. He thought it rather early to appoint inspectors, as the disease was not yet on the continent. He thought if the time came when we had it to deal with, it would be a great expense, and that for the time it might be well to depend on the coast quarantine. If we did proceed to quarantine, he believed in doing it thoroughly. The epidemic of a few years ago in Europe did not reach the United States, and he had faith that the cholera would not this time. He said it was wise, however, to take preventive measures and put our house in order.

Dr. Cochran, Chairman of the Board, stated that he called the meeting to take action promptly, and be prepared for activity in any emergency. He suggested that the Secretary, as the executive officer of the Board, should be clothed with certain authority, so as to be ready to

take immediate action. He thought a circular letter should be addressed to local Boards, health officers, and physicians throughout the State, asking coöperation; also, that local inspectors should be stationed to guard and inspect trains on the State's borders, and vessels at coast points.

Dr. Cluness believed with the others, that the appointment of Inspectors might be deferred until later on, but the Board should take steps to educate the people in regard to the threatened approach of the cholera. There were doubtless many people in the State who were not yet aware of its spread in Europe and of the gravity of the situation. He thought it would be well to have some system adopted to tell the people all about the disease. A single educator, like Dr. Laine, might do a great deal. Incidentally he said that the germ of cholera was a tangible thing, and that as long as people did not swallow it they would not be affected. He said it could not be conveyed in the air, and that there were many simple primitive measures that people should know. He did not think a circular letter would reach the people, and suggested that three or four live medical men could do much by inaugurating a system of lectures.

Dr. Laine suggested that as there was but little over \$5,000 in the contagious disease fund, they might find it necessary to exceed that amount, and he wanted to know clearly his authority in regard to the appointment of inspectors and as to other measures.

Dr. Ruggles, who had been engaged in sanitary inspections and measures in British Columbia and on the northern boundary of this State, offered many valuable suggestions as to the proposed establishment of Quarantine Inspectors, location of stations, etc.

Professor Rising, Chemist of the State University, was present, and volunteered to make certain investigations and researches in the medical works of the University, among which are those of the Imperial Board of Health of Germany, in regard to cholera investigation and information.

After a long discussion of the proper measures to be taken, and the main points to be guarded, the Board finally decided to give Secretary Laine authority to take any action considered necessary. The following resolutions were passed:

Resolved, That in view of the probable approach of cholera to the borders of the State, the Secretary is hereby authorized to appoint, for the State Board of Health, competent Medical Inspectors, invested with specific powers, to be placed at the points of entry of the railroads into the State, and at such maritime ports as may require protection, and to go on duty as soon as called upon by the Board through its executive officer.

Resolved, That the Secretary be instructed to request the Governor to supply the necessary tents for field hospital purposes at the land quarantine stations, also such camp equipments as it is possible for the military arm of the State service to supply.

Resolved, That the Secretary be authorized to employ an assistant, who may act as Supervising Inspector and render such other assistance as may be necessary, and that the matter of salaries for Medical Inspectors be left to the Secretary with power to act.

Resolved, That a committee of three be appointed, composed of the Secretary (Dr. Laine), Dr. Cluness, and Dr. Ruggles, to prepare a circular letter on cholera, and the course to be taken during its prevalence, for general distribution to the public.

In view of the general prevalence of smallpox in Lower California, it was suggested by Dr. Remondino, that Dr. C. A. Ruggles, delegate to the Pan-American Public Health Association, a meeting of which is to be held at the City of Mexico, in November, be instructed to confer with the Mexican authorities with a view of causing all residents of the territory of Lower California to be vaccinated.

The meeting then adjourned, to meet in conference with the Board of

Health of San Francisco, and the Secretary was authorized to telegraph a request to Mayor Sanderson to call a meeting of the local Board for the conference at 9 A. M. on the 7th inst.

Dr. M. Gardner appeared before the Board in behalf of the Board of Trustees of the Mendocino Insane Asylum, and invited the Board to make an official visit to that institution at the time of the quarterly meeting in October.

Adjourned special meeting of the State Board of Health, September 7, 1892, 9 A. M., San Francisco, Cal.

Those present were: Mayor Sanderson, in the chair; Drs. W. H. Mays, Bucknall, and Regensburger, of the local Board; Drs. Cochran of Los Angeles, Ruggles of Stockton, Remondino of San Diego, and Laine of Sacramento, of the State Board; Dr. Lawler, State Quarantine Officer, and Dr. Keeney, local Health Officer.

A general discussion took place on the question of quarantine.

Dr. Regensburger thought the greatest danger from cholera infection was not by sea, but by land. He advocated the locking of all entrances to the State the moment cholera was known to be in the country, and that a strict quarantine be enforced. All baggage, freight, and the clothing of passengers should be fumigated, as well as the cars. The passengers and baggage should be put in a new train of cars this side of the border. That was the only way to shut it out.

Dr. Mays concurred.

Dr. Laine saw difficulty in the way of carrying out a strict quarantine. They could not get the National Guard to form an absolute cordon all along the border. He thought a land quarantine impracticable. They could only do that which was practicable.

Dr. Cochran said: We have only an appropriation of \$5,000, and would have to get the State Legislature to make a further appropriation.

The Mayor saw no difficulty in fumigating the baggage. When he was on the Danube the officials opened the baggage, spread out the contents and fumigated them by spraying. Why not do the same here?

Dr. Mays said: We ought to place a cordon at the four main points—Truckee, Ashland, Yuma, and The Needles.

Dr. Ruggles did not think a strict land quarantine practicable. But where there was a suspicious case the car should be side-tracked, the patient taken out and put in a hut or tent. He suggested an alliance between the States of Oregon, Washington, and California, and by acting in concert they could do a great deal of good. The greatest danger was from the Canadian border.

Dr. Cochran thought it quite feasible to stop all cars at the border and prevent them from entering the State.

Dr. Lawler explained the system of fumigating the baggage of passengers by sea. The danger of contagion was not so much in the individual as in the clothing and baggage. There need be no difficulty in fumigating the baggage of passengers by land.

After further discussion, Dr. Mays moved that the Washington authorities be urged to have the new fumigating steamer put in commission at once, which was adopted.

The members of the State Board of Health accompanied Dr. Lawler in his launch to the quarantine station.

Hospital Cove is one of the prettiest spots imaginable. It is surrounded by a range of high hills, which is a safe protection against storms.

The party was met at the landing by Dr. Carmichael, Marine Hospital Surgeon, in charge of the station. The buildings were all inspected thoroughly; they were all in fine condition.

In the sheds erected by the steamship companies, the barracks and the lazaretto there is accommodation for about eight hundred patients. There are three tiers of bunks, each bunk being able to accommodate four patients. At the last quarantine there were about one thousand people on the island.

There are three large cylinders, each forty feet long by eight feet in diameter, strongly supported in cast-iron saddles. Each cylinder has two jackets, and when the clothing or other effects are hung up by the hooks inside, the iron door is closed, a valve is opened, and the heat flows in. Then, if necessary, another valve can be opened to let in steam in the same space between the jackets. The heat can be run up to 300° if necessary, but 200° will kill all microbes.

It is intended to build a house for non-contagious diseases, also additional barracks.

Everything is in ship-shape order, and the members of the State Board expressed themselves as exceedingly well pleased with the appliances, and the situation of the cove.

The meeting adjourned until 3:30 p. m.

At the afternoon meeting Vice-President C. F. Crocker and General Manager A. N. Towne, of the Southern Pacific Company, were present.

Dr. Cochran explained the gist of the morning's discussion.

Vice-President Crocker stated that the railroad company was anxious to coöperate with the Board in its efforts to prevent the scourge from entering California. Yet the company did not desire to be restricted so that its interests might suffer needlessly. The company was willing to furnish hospital cars and instruct its employes to aid the health authorities in every way.

General Manager A. N. Towne stated that he would issue any instructions to the Division Superintendents of the Southern Pacific that the health officials might deem pertinent to the subject.

A discussion ensued as to the best means to be adopted, so that while using every precautionary measure, due regard would be paid to the convenience of the traveling public.

Inasmuch as cholera had appeared in South America, a resolution was adopted by the State Board requiring the fumigation of all vessels from South American ports to San Francisco at San Diego. The resolution was also adopted by the local Board.

Upon Dr. Remondino's motion the following resolution was adopted:

Resolved, In view of the fact that the port of San Diego, and those on Puget Sound, are unprotected by efficient and fully equipped quarantine stations, and that vessels touching at those ports are not subject to further quarantine when reaching San Francisco, the California State Board of Health would respectfully urge the immediate equipment of the San Diego and Port Townsend quarantine stations with the most approved form of disinfection apparatus, and that there be also erected such temporary shelter as the probable urgency of the situation may demand.

It is believed that the placing of these stations in as efficient condition as the one at San Francisco will not only protect the maritime ports of the coast, but will assist more

than any other measure to make effective the system of land quarantine contemplated by the State authorities, and at the same time allay public apprehension by a feeling of security due to having made all possible efforts to guard against the epidemic.

The resolution was adopted by the State Board and concurred in by the local Board, and the joint meeting adjourned.

Adjourned special meeting of the State Board of Health, September 8, 1892, at 8:30 A. M.

Present: Drs. Cochran, Ruggles, Remondino, and Laine.

The Secretary read the following communication, which was ordered placed on file:

COLUMBUS, OHIO, August 27, 1892.

DR. J. R. LAINE, *Secretary of the State Board of Health, Sacramento, Cal.:*

DEAR SIR: I have the honor to inform you that, at a meeting of the Executive Committee of the National Conference of the State Boards of Health, held in Indianapolis August 28th, you were appointed a member of the Quarantine Inspection Commission, created by the committee. The other members of the Commission are: Dr. Baker, of Michigan; Dr. McCormack, of Kentucky; Dr. Watson, of New Hampshire; either Dr. Solomon or Dr. Holt, of Louisiana; Dr. Bryce, of Ontario, and Dr. Orramanos, of Mexico.

You are respectfully requested to make an inspection of all quarantine stations of the Pacific Coast; to note their equipment and efficiency of administration, and to report at the earliest possible date to Dr. McCormack, President of the Conference of the State Boards of Health. It is suggested that a preliminary report is desirable soon, a complete report to be made at your earliest convenience.

Expenses of the Commission will be refunded by the Conference.

Yours truly,

C. O. PROBST,
Secretary.

An assessment of \$10 by the International Conference of Boards of Health for the expenses incurred at a late meeting at Indianapolis was ordered paid.

The Secretary was instructed to visit the different quarantine stations on the coast, and also to inspect sites for quarantine camps or refuge stations at points where it may become necessary to establish them.

The following circular was read and placed on file:

CIRCULAR.

Personal Effects and Baggage of Immigrants from all European and Asiatic ports to be Disinfected at Ports of Departure.

1892.
Department No. 147. }

TREASURY DEPARTMENT, OFFICE OF THE
SUPERVISING SURGEON-GENERAL MARINE HOSPITAL SERVICE,
WASHINGTON, D. C., August 24, 1892. }

To Collectors of Customs, Medical Officers of the U. S. Marine Hospital Service, Agents of Foreign Steamship Lines, Local Quarantine Officers, and others whom it may concern:

Department Circular No. 141, dated August 17, 1892, relative to the disinfection of the personal effects and baggage of immigrants prior to embarkation, is hereby extended to include the baggage and personal effects of immigrants from all European and Asiatic ports; and it is further ordered that the provisions of the circular thus amended shall become operative on and after this date, except for articles of baggage, etc., afloat prior to the promulgation of this order, which must be disinfected on arrival.

H. W. AUSTIN,
Surgeon M. H. S., for the Supervising Surgeon-General.
Approved: CHARLES FOSTER, Secretary.

The Board then adjourned to meet at the call of the President.

Regular meeting State Board of Health, October 24, 1892.

Present: Drs. Cochran, Cluness, Ruggles, and Laine.

The minutes of the three previous meetings were read and approved.

The Secretary reported having appointed three Medical Inspectors during September, agreeable to resolutions passed by the Board at the special meeting held on September 5th.

Dr. P. G. Cotter was appointed to act at Yuma, on the S. P. R. R., and Dr. James P. Booth at Needles, on the A. and P. R. R., while Dr. C. A. Ruggles was sent to the State line near Truckee.

Each Inspector received the same instructions, except as to local points:

Dr. Cotter found it necessary to stop two different trains, detaining passengers at Ogilby Station, 16 miles west of Yuma. In both instances it was found that there was no contagious disease aboard, and the passengers and cars were allowed to proceed.

Six hospital tents were purchased by the Secretary from Neville & Co., of San Francisco, and sent to Dr. Cotter, and six more were sent to Dr. Booth, at Needles. They were paid for out of the contagious disease fund.

A bill of \$154 50 for two special trains, and for ice and water furnished the quarantined passengers at Ogilby by the S. P. R. R. Co., was received.

The salary for a clerk in the office of the Secretary for one month, amounting to \$60, was also reported.

The action of the Secretary was approved, on motion of Dr. Cluness, but the bill of the S. P. R. R. Co. was ordered returned to Dr. Cotter for approval, and then to be sent to George A. Knight, the attorney of the Board, to learn if it is a bill that the State is liable for. When it is so declared by him, the Secretary was instructed to cause it to be paid—otherwise, to hold it, and notify the S. P. R. R. Co. accordingly.

All the other expenses incurred by the Inspectors, including salary of the Secretary's clerk, were ordered paid out of the contagious disease fund.

The Secretary also reported having complied with the instructions of the Board in having had a circular on cholera printed and generally distributed.

His action was approved.

The following report was presented by Dr. Ruggles, and ordered placed on file:

To DR. J. R. LAINE, Secretary State Board of Health:

DEAR SIR: I most respectfully report that early on September 19, 1892, I received a letter from you notifying me of my appointment as Medical Inspector, and requesting me to report at Sacramento immediately for instructions, and to take position on State line between Truckee, Cal., and Reno, Nev. The S. P. R. R. provided me with transportation pass, and a letter to its employes instructing them to cooperate with me in all my endeavors to carry out your instructions.

Upon my arrival at Truckee, I placed myself in communication with the Division Superintendent, who advised me to make Reno, Nevada, my headquarters, as from that point I could more easily and more conveniently, as to time, intercept the trains from the East. To prepare myself for any emergency that might arise, caused me as early as possible to select a suitable location for a quarantine hospital or refuge station. My attention was specially directed to a place near the State line in California, apparently designated by nature for the very purpose. It was well protected from winds by surrounding hills; well wooded, and abundantly and conveniently watered by the Truckee River.

Close proximity to a side-track rendered any lengthy transportation of the sick, or hospital supplies, unnecessary. Satisfactory arrangements were made with the local railroad authorities for spare cars for temporary hospital purposes, and for fumigation and disinfection of baggage and clothing. It was so arranged that by running an engine

side by side with the car designated for fumigation, steam could be easily injected by the locomotive, rendering the fumigation by sulphur much more effective, for experience has taught us that sulphur fumes without moisture are not of much account as a germicide. Upon my arrival at Reno I was soon convinced that it was good sanitary policy to put myself in telegraphic communication with the company's agent at Ogden, whose duty it was to exchange the tickets of all passengers on the Union Pacific and Denver and Rio Grande roads, thus giving him an excellent opportunity of personal inspection of every person to arrive in California over the Central Pacific Railroad. Every morning at 8:30 o'clock I received a message from him, stating his opinion as to the passengers examined by him the day before.

The conductors on all trains, and all other employes, were directed by Mr. Fillmore, General Superintendent, to assist me in every possible manner, and were specially instructed by me to make particular examination of every passenger in their trains, and if any suspicious case should present itself to report to me in person at the depot, on arrival of train at Reno. I then boarded the train, and as soon as the State line was reached, I went through every car, making a particular personal examination of every person. All my previous favorable opinions of the efficiency of the quarantine authorities at New York were fully confirmed by the uniform presentation of the certificate of the proper officer vouching for the faithfulness of the fumigation and disinfection of passengers' baggage and clothing, and the healthy condition of the person at the date of its issuance.

Having detected an unpleasant spirit of jealousy as to California exercising authority in the State of Nevada, I studiously avoided giving any cause for complaint in that line by doing no official act until the train had passed the line dividing Nevada from California.

Upon my arrival at Truckee my examination was completed, and I would return to Reno by freight train, having a special permit to do so from the Division Superintendent, arriving about 4 P. M.; at 8:30 P. M. the evening train from the East, composed of first-class passenger coaches and Pullman cars, would arrive at Reno, the conductors of which would make a personal report to me on their arrival; if there was anything suspicious I would accompany the train to Truckee for personal examination.

During the period of my official career as Medical Inspector for eighteen days I had no occasion to detain either car or passenger. There was quite a number of cases of sickness of different character on the trains, but I found none that justified a moment's detention of passenger or car. My attention was very forcibly directed to the dirty, filthy, and unsanitary condition of the emigrant cars. I notified the proper authorities that cars in such condition should not be allowed to enter California. Soon a great improvement followed.

In conclusion, I wish to state that in all my official connection with railroads, I had the hearty coöperation of all its officers and employes.

C. A. RUGGLES, M.D.

October 22, 1892.

A lengthy discussion concerning quarantine matters was brought to an end by the appointment of Drs. Cochran and Ruggles to locate a station near Yuma, on the west side of the Colorado River, some time in November. This was deemed prudent, so as to equip it and have it ready for any emergency in the spring.

This was deemed necessary because of the expense incurred during the recent cholera alarm, when it was found to be an extremely costly matter to detain people on the desert and properly care for them.

Dr. Cochran believed that the Board should employ a microscopist in Sacramento and at Los Angeles to examine the dejecta of suspected cases of cholera, as only by this means could a diagnosis be determined with certainty as to whether suspected cases were cholera or simple non-contagious disease.

Dr. Cluness thought the matter very important, inasmuch as recent investigations had proven that the cholera germ was found in great numbers in the discharges of persons for a variable length of time prior to an attack of cholera, and for some time after recovery from the disease, which was, in his opinion, sufficient to account for the extreme difficulty of establishing an effectual quarantine against it. He believed that a convalescent could carry the contagion by discharges from the bowels after he was discharged as cured, as the investigations recently made proved that the dejecta still contained cholera germs after the patient was pronounced cured. He believed that competent micro-

copists should be employed by the State Board, in case of an epidemic during the next summer.

The matter was deferred until the next regular meeting.

Dr. C. A. Ruggles was duly elected delegate to the Public Health Association, to meet in Mexico in December.

The State Board of Health met in regular session at 8 P. M., January 30, 1893.

Present: Drs. C. A. Ruggles and J. R. Laine. Communications were received from the other members, giving excuses for not being present. There being no quorum, the Board adjourned to meet at San Francisco on February 10th, to consider such business as may come before it, and to go to Ukiah to inspect the sanitary construction of the Mendocino Asylum for the Insane.

The Board met in regular adjourned session at 8 o'clock P. M., February 10th, at the Palace Hotel, San Francisco.

Present: President Cochran, Drs. C. A. Ruggles and J. R. Laine.

Communications from other members were received, stating sufficient reasons for absence. It was determined to proceed to an examination of the Mendocino Asylum at Ukiah.

The Board arrived at Ukiah February 11th, in company with Thomas L. Carothers, President of the Commission, Dr. E. W. King, C. O'Connor, and Dr. M. Gardner, members of the Commission, in whose company, including also W. G. Copeland, Architect, an inspection was made of the buildings and grounds.

The grounds comprise one hundred and thirty acres of valuable bench and valley land, lying on the east bank of Russian River, about two and one half miles southeast of the town of Ukiah.

The main building, about six hundred feet long, faces the valley to the west, while the mountains rise in imposing heights in the rear toward the east, their base reaching the eastern limits of the State land.

The water supply is obtained from Mill Creek, a stream descending a cañon east of the grounds, and traversing the southern border as it flows into Russian River. The water is taken from Mill Creek one and one half miles from the buildings and is to be conveyed into a reservoir at an elevation of 200 feet above them, and thence by pipes already laid to the points required, where the pressure will be sufficient for fire as well as for domestic and irrigation purposes.

The water is of excellent quality. The site of the building is all that could be desired for salubrity, but it is not as imposing as if it had been placed on a higher elevation, but this could not have been done without a sacrifice of good land and water pressure. The buildings are substantial, and all the expedients of architecture have been adopted to obtain light by windows. The work shows signs of careful supervision. Each wing of three stories, 300 feet in length, meet at a point where the Administration Building is to be attached on the west face of the structure, in the rear of which, extending eastward like a broad stem of the letter "T," is a building attached by a narrow corridor to the ward where the kitchens, dining-rooms, sculleries, pantries, clothes-presses,

store-rooms, and servants' rooms are located on the ground floor, and sewing and sitting-rooms for female patients on the second floor.

The floors and woodwork, while plain, show more finish than is usually observed in a public building.

The ventilation and lighting by windows is unexceptionable, except the kitchen, which is cement floored, 26x34 feet in dimensions, with scullery on east side and pantry on the west, and lighted by four windows on the south side.

These four windows, designed for lighting, are the only means for ventilating the kitchen and carrying away the steam from six or eight large cauldrons for soup, rice, potatoes, and stews, and the smoke from roasting, broiling, and frying ranges, cooking food for five or six hundred people. No provision at all seems to have been contemplated for this purpose, except eight 12-inch flues, four at each end and two on the south side, and it seems likely that unless some modification of the present arrangement is made before the permanent occupation of the premises, much vexation will be experienced because of steam and smoke, which will invade the corridors in seeking an escape. It may be presumption to suggest an expedient without consulting an architect, but the solution of the difficulty appears feasible by only marring the symmetry of the sewing-room above the kitchen: by the construction of square ventilators at each end of the kitchen to carry steam and smoke from the kitchen canopies through the roof, or the construction of two or three cylindrical drum ventilators from the canopies to pierce the roof. If the latter expedient should be adopted, the ventilating drums could be converted into columns in the sewing-room above. A large square ventilator at each end of the kitchen, against the chimneys, would, if sufficient, be the most economical and sightly.

There is a three-story water-closet and bath-room combined, in the rear of each wing of the ward, connected by a narrow corridor; each floor containing two stalls for urinals and two seats over hoppers in the first room, and two porcelain-lined iron tubs in the rear rooms. Each water-closet is intended to accommodate sixty persons; this furnishes two seats for that number of patients, which is deemed altogether inadequate. The Board would recommend that the urinal stalls be increased to four in each closet, and the seats be increased to six, if possible; this should be done before the completion of the buildings for occupancy.

The bakery and laundry are under one roof, and situated almost 200 feet in the rear of store-room and kitchen, on a terrace 10 feet high. This is a two-story brick structure 64 by 130 feet, with cemented floor. The engine-room is situated about 30 feet north of this building. For convenience, the laundry and bakery should have been located on a level with the asylum, so that soiled clothing could be conveyed by car on a tramway to the laundry, and clean clothes returned in the same way. It would be more convenient to convey the 600 or 700 pounds of bread that will be used daily at the asylum, by tramway, than to carry it by hand; as at present contemplated, clothes and bread will be carried between the two buildings.

No provision is made for a chute for soiled clothing. It will be necessary to carry all soiled clothing and bedding down the stairs used as a common stairway, or to send them down the elevator. This will necessitate too frequent handling. An iron chute extending from the third story to the ground, with openings at each story, might be placed

at the angle of junction of the corridor with the main building. All soiled clothing could be dropped down the chute to a car, which should carry them to the laundry and return them clean to the elevator. In order to accomplish this, it will be necessary to continue the tramway from the basement of the kitchen building into the yard in the rear of the terrace, which must either be cut through, or tunneled and arched, to the bakery and laundry, where an elevator may be cheaply improvised, to raise the car on a platform to the level of the floor. The track would be on the division line of the yard and would interfere neither with view nor convenience.

Drainage.—Ample provision has been made for the disposal of waste water from the roof, but no sewers have as yet been constructed for the asylum or the laundry.

The main sewer should begin at a point between the kitchen and the laundry, where it should receive a branch from the laundry and a branch from the kitchen, and still farther north a branch from the north wing closets, the main sewer continuing past the north wing in a northerly direction to the low-lying garden lands one eighth of a mile or more distant, where it may be utilized for irrigation purposes in summer and washed away by the floods in winter.

The water drained from the irrigated land would be free from odor, and run by natural easement, aided by a ditch already constructed, to Russian River. The disposal of the sewage by this simple plan is practical and feasible, and nothing but gross stupidity and a total disregard of the sanitary expedients of recognized merit and utility can give offense.

There may be excuses for the offensive delinquencies of drainage in old institutions, but there can be no condonation for any insufficiency in a new one, with ample fall and easy facilities.

The lighting is by gas, but there will be water enough in Mill Creek to furnish power to light the whole building by electricity during at least six months in the year. Provision should be made for lighting the entire structure, also detached buildings, with electricity. It may be purchased from the city works if it is not desirable to manufacture it.

The State Board of Health met in regular adjourned session February 13, 1893.

Present: Drs. Cochran, Cluness, Ruggles, and Laine.

On motion of Dr. Ruggles the reading of the minutes of the last meeting was dispensed with.

The Secretary reported having been called upon to investigate small-pox at or near San Luis Obispo, and that it was found necessary to send Dr. L. A. Elster as Special Inspector. This action was approved, and it was ordered that Dr. Elster continue to act as Special Inspector during the presence of this disease at that and other points in the State.

Dr. C. A. Ruggles read the following report of his work in selecting a site for a refuge station for quarantine purposes near Yuma, which was received and placed on file:

To DR. J. R. LAINE, Secretary State Board of Health:

I most respectfully report that at the regular session of this Board held September, 1892, a resolution was adopted requesting Drs. Cochran and Ruggles to act as a committee to select a suitable site for quarantine purposes somewhere near Yuma, in the event of

an invasion of cholera. In accordance with said resolution, I proceeded to San Francisco for the purpose of consulting the S. P. R. R. Co., so that we might by concert of action make our selection of a station effective for the desired purpose, with the least inconvenience to the railroad company. In an interview with Mr. Towne, General Manager, I found the company ready and willing to cooperate with your committee, and, to further said project as much as possible, furnished me with an order for a special engine and other accommodations for the purpose of going over the road in our selection of site.

On Tuesday, November 22d, your committee, accompanied by Dr. Price, Health Officer of San Bernardino, by special invitation, met Dr. Cotter, of Yuma, who had been Medical Inspector of the Board at that point, and was able to furnish your committee with much valuable local information. By special car we proceeded about six miles from Yuma, on California side of the Colorado River, to a place known to railroad authorities as "El Rio." We there found many points which admirably fitted this location for a quarantine station. It being near the river assured us plenty of water, and, in fact, the four grand requisites were at hand, viz., wood, water, a switch, and telegraphic communication, easily to be procured.

It was unanimously decided by your committee, concurred in by the medical gentlemen present, to report favorably on this location as a quarantine station, in the event that cholera should invade the State.

The object for which your committee was formed having been satisfactorily accomplished, Dr. Cochran returned to Los Angeles, and I, who had been elected to represent this Board at the Pan-American Public Health Association, to convene at the City of Mexico, proceeded on my journey to that city.

Nothing worthy of mention occurred during the trip, excepting possibly the pleasure of meeting many notable sanitarians, who were traveling from all parts of the United States and Canada, and converging towards one particular road, viz.: Mexican Central Railroad.

The perfection of the arrangements of the Central Committee was very remarkably shown, by a delegation of said committee meeting our train fifteen hours before our arrival, and assigning all the delegates to their proper places, thus avoiding much confusion and trouble that must have otherwise arisen. Our reception all along the line was a perfect ovation, each endeavoring to outdo the other in courtesy and kindness. In cities the municipal authorities would receive us with music and speeches, and in capitals of States the Governors would extend like favors, the band in each and every instance forcibly reminding us of home, by playing "Hail Columbia" and "Yankee Doodle," and our Canadian brother, not to be neglected, was treated to "God Save the Queen." It had been planned for the delegates to stop over one day at Zacatecas, so well known as a locality entirely free from tubercular troubles, and notable for its wonderful silver mines; but we were advised by the Health Officer of the presence of typhus in an epidemic form, therefore we deemed it prudent not to stop. The great majority of the delegates arrived at their journey's end on Sunday, November 27th. The hearty coöperation of President Diaz, and others high in authority, with the Central Committee of Arrangements, prevented the possibility of a doubt as to the success of the reception and entertainment of the association.

It was promptly called to order at 9 A.M., November 29th, at the Chamber of Deputies, by President Formento, of New Orleans, a gentleman of much parliamentary experience, and admirably fitted to control a large assembly of this character. The Secretary reported 578 delegates present, one half of which number were from United States and Canada.

The proceedings were conducted strictly in accordance with the printed programme, in English and Spanish, furnished to the delegates each morning. Each member was furnished with a translation of the paper to be read, which made it very easy to follow along during the reading of it.

A paper was read by the State Health Officer of Texas, which created much interest as well as some excitement, and as we of California were particularly concerned, I paid very close attention to it. It charged Mexico with carelessness, want of attention, and negligence as to infectious and contagious diseases on the Rio Grande, and as an illustration of that statement it was mentioned that there had been in Texas over 1,400 cases of smallpox, and 400 deaths, all clearly and positively chargeable to want of care and gross inattention on part of Mexican authorities. I watched the matter very closely, as a resolution of this Board instructed me on that very subject, making me a party unusually interested. It finally culminated in an international question, and a resolution was adopted recommending a National Commission of equal number of delegates from each Government, to which should be referred the whole matter.

Very interesting and instructive papers were read and fully discussed relating to consumption and diphtheria.

The ignorance of the public as to the origin and nature of consumption, of its communicability, was lamentably noticed.

The fact that more than 100,000 persons die of this disease annually in the United States, and the fact that by its (to a certain degree preventable) communicability this great number of deaths is kept up to so great a figure, shows conclusively that the public mind is not enlightened as it should be by proper authority, and to whom better can this important duty be assigned than to State and local Boards of Health? The carelessness of those afflicted as to where they expectorate, and the inattention of those whose duty it may

be to look after the cleanliness of what they have in charge, caused much animated discussion, and the universal opinion forcibly expressed was, that those most interested in sanitary matters were not doing their entire duty in the matter of instructing the people as to the danger continually menacing them in this one disease.

It was generally conceded that legal enactment should compel railroads and other public carriers to be more careful as to providing receptacles for the expectoration of phthisical patients, and to disinfect those vessels often and thoroughly. In the same session the subject of diphtheria was discussed; all those engaged in the discussion contended that at least for sanitary purposes diphtheria and membranous croup were identical, only differing as to the location of the exudation, and that the same precautionary measures should be adopted in the management of both. One particular fact was mentioned by our Mexican brethren: That previous to the French invasion to favor and assist Maximilian in his aspiration for imperial honors, croup and diphtheria were unknown in Mexico, but since that time there has been much of it and quite fatal in its results. Wednesday being Inauguration Day, and the hall being used for those ceremonies, there was no morning session, the Association, by invitation, being present and attending in a body at National Palace, to offer our congratulations to President Diaz.

The subject of national or local quarantine occupied the attention of very many delegates, the New York and Louisiana delegations contending against what was called by some an invasion of States rights by the General Government and meddling with local affairs. The question was very adroitly handled, so that no collision of sentiments to any dangerous degree took place. I am satisfied that the opinion of the great majority was in favor of the United States Government taking sole and entire charge of all quarantine matters.

At a conference of State Boards of Health held at Nashville, Tenn., three years ago, the delegate of this Board was instructed to present a resolution expressing the sentiment of this Board, that the interest of sanitary science would be better advanced by a meeting of State Boards with the American Public Health Association, and a special section framed for the express purpose of discussing such matters as usually were presented to State Boards. As is well known, that resolution met an ignominious fate, but the wisdom of such a resolution was most beautifully shown at this convention. A time and place were designated for a conference of all representatives of State Boards of Health and those who were connected with quarantine stations. The attendance was large, many State Boards were represented: Canada by delegations from Montreal and Quebec quarantine stations; Ontario, by that veteran sanitarian, Dr. Bryce; New Orleans, by Drs. Mayer and Oliphant; New York, by Dr. Jenkins, and Boston by Dr. Durgan, who is now President of the Association. Dr. Bailey, of Kentucky State Board of Health, was chosen to preside. Dr. Probst, of Ohio State Board, was Secretary. A free and full discussion was entered into by all as to the probability of an invasion of cholera next season, and as to what preventive and protective measures had been made, and what should be made. Your representative gave what he flattered himself to be a very particularly interesting statement of what action this Board had taken, and what it intended to do in relation to land inspection and formation of quarantine stations. He was very particular as to his description of the station at Angel Island, and did not omit to speak highly of the efficiency of Dr. Lawler, the Quarantine Officer. He assured the Eastern brethren that they need have no fear or uneasiness of any contagious disease coming into this community through the State of California. It was the unanimous opinion that cholera at this time was only dormant, and that as soon as favorable circumstances arise in the coming spring and summer it would fully develop and we be threatened with another invasion, and that it was the great duty of all interested in sanitary work, particularly State and local Boards of Health, to prepare for its reception.

The conference was very interesting as well as instructive, many prominent sanitarians taking part in the discussion. A full and very interesting account was given of the management of the cholera at quarantine stations of New York by Dr. Jenkins, the Health Officer at that point.

Many reports of the gross carelessness and inattention of the Mexican sanitary authorities, as to contagious diseases (possibly much exaggerated), were in circulation among the many visitors to the republic.

Although I was admonished to be on the lookout for smallpox, and was paying strict heed to the admonition, I will say that I did not see any one variolously afflicted.

I did, however, see an unmistakable case of leprosy selling fruit at one of the railroad stations, to passengers on the train; although I had no jurisdiction nor authority for action, I did most strenuously and successfully caution the passengers about buying anything from the poor unfortunate victim.

This Board was duly honored by President Formento, by the appointment of your delegate as one of the Advisory Committee to represent California.

Respectfully submitted.

C. A. RUGGLES, M.D.

Dr. W. G. Cochran read the following report of his action in selecting a site for quarantine purposes near Yuma:

LOS ANGELES, CAL., November 29, 1892.

To the State Board of Health:

The undersigned committee appointed to select a site for a quarantine station near the California line on the Southern Pacific Railroad, Yuma Division, report: November 22d, accompanied by Dr. Price, of Colton (formerly a resident at Yuma), we proceeded to Yuma, where we were met by Dr. Cotter of that place. At an early hour on the morning of the 23d, having been provided with special engine and caboose by the railroad company, we all proceeded westward, and found a new line of road was being constructed westward from the Colorado River to El Rio, six miles west of Yuma. At El Rio, on the bank of the Colorado River, we found a railroad spur, or track, built off south to the river bank, and to an old quartz mill. Immediately adjoining this mill is an adobe building; farther east are four or five more adobe buildings, one of which we found in fairly good repair and well located for hospital purposes, being four hundred feet from what is now the railroad, and six hundred feet east of the track to the old mill. In close proximity to this building is another that could be used for hospital purposes if necessary.

By the railway company leaving four hundred and fifty feet of what is now the traveled road, the same could be used as a switch upon which cars for bathing and fumigating could remain, at a point four hundred feet south of the new line, and four hundred feet north of the hospital.

On the track running to the mill could be left a car with ice and provisions, also sleeping cars for detained passengers. The old mill could be used for shade and dining-room, while the adobe adjoining would answer for a kitchen.

There is plenty of wood corded up in the immediate vicinity.

The above described buildings, and the ground on which they are situated, are the property of a mining company, of which O. F. Townsend, of Yuma, is agent. We saw the agent, and he corresponded with the owners of the property, and writes that he is authorized to lease the same to the State Board of Health, or its representatives, at such rent as can mutually be agreed upon. This is the only place near the California line on the railroad that is at all suitable for quarantine purposes, and while this will be a hot place in hot weather, it is the first place to be found, the adobe buildings described answering for hospital and other purposes, plenty of wood on the ground, and the Colorado River furnishing plenty of water for all purposes. These advantages, together with the extra railroad track all ready for use, warrant us, we feel, in recommending this point as the most suitable to be found for purposes of quarantine.

We further recommend that the proper representative of the Southern Pacific Railway Company be at once seen and asked to allow the necessary railway tracks to remain.

We herewith append a diagram of the railway track and buildings, all of which is respectfully submitted by your committee.

W. G. COCHRAN.
C. A. RUGGLES.

YUMA, ARIZONA, November 28, 1892.

Hon. President State Board of Health, Sacramento, California:

DEAR SIR: I am authorized by the owners of the El Rio property, five miles west of here, to rent the same for a quarantine station, to the State of California, at such rent as your honorable Board, or its representative, and myself, can agree upon, at the proper time.

Very respectfully,

O. F. TOWNSEND,
Agent.

Report received and placed on file.

On resolution by Dr. Ruggles, the Secretary was instructed to issue a circular invitation for a Sanitary Convention to be held in San Francisco, on April 17, 1893, to consider the best means to prevent the introduction of Asiatic cholera within the State during the coming season, and to combat it if introduced; also to consider such other matters as may properly be discussed in sanitary convention.

On motion of Dr. Cochran, Drs. Cluness, Ruggles, and the Secretary were elected as a Committee of Arrangements for such convention.

The following communication was received from Dr. Cochran, in which he tendered his resignation as President of the Board:

GRAND HOTEL, SAN FRANCISCO, CAL., }
February 13, 1893. }

To the Members of the State Board of Health of California:

GENTLEMEN: I have accepted a responsible position, that renders it necessary for me to retire from the practice of medicine. The indications are that an unusual amount of work and responsibility will devolve upon the Board the coming summer, and realizing

that I will not be in a position to render the service necessarily devolving upon the President of the Board, I respectfully tender you my resignation as such, to take effect at once.

I desire to express to you my sincere thanks for the honor you conferred on me by electing me your President, and for the courteous consideration I have at all times received at your hands.

Respectfully,

W. G. COCHRAN.

On motion of Dr. Ruggles, the resignation of Dr. Cochran was accepted.

Dr. Cluness placed Dr. Ruggles in nomination for President of the Board, and by consent the Secretary was instructed to cast the ballots for his election. This being done, Dr. C. A. Ruggles was declared duly elected President of the State Board of Health.

Adjourned.

The regular quarterly meeting of the State Board of Health was held at the office of the Secretary, at 1:30 P. M., April 16, 1893.

Present: Drs. C. A. Ruggles, C. W. Nutting, W. F. Wiard, J. H. Davison, and Winslow Anderson.

Reading of the minutes of the last meeting was dispensed with.

This being the first regular session since the appointment of the Board by the Governor, the members presented their commissions, which were declared to be in due form.

The President stated the first business to be the election of a President and of a permanent Secretary.

Dr. Winslow Anderson nominated Dr. C. A. Ruggles for President, and he was declared duly elected President of the Board for the ensuing year.

Dr. C. W. Nutting placed Dr. J. R. Laine in nomination for permanent Secretary for the term for which he was appointed, and he was unanimously elected.

Drs. Ruggles and Laine reported having received communications from people at Yuma, A. T., protesting against the location of a quarantine station at El Rio, on the California side of the Colorado River; also, a letter from the Attorney-General, calling attention to the fact that the location of a station at that point would conflict with a Federal law, which prohibits such stations being placed within five miles of an Indian reservation. It was deemed advisable for the President and Secretary to proceed to Yuma, to remove the objections, if possible, and to obtain such information as would enable the Board to formulate plans for the future. Upon arriving at that point it was found that a canal company contemplated putting a canal through at El Rio, and expected to locate their buildings on the site selected for a quarantine station. This company is represented by Attorney-General Hart, as their attorney, who, as the legal adviser of this Board, advised us to locate farther away. The point advised by the people of Yuma is 16 miles west of Yuma, on the inhospitable desert, where there is no shelter, no water, nor a blade of grass. On this dreary desert it is urged that cholera-infected trains be stopped and cleansed. This plan presented no insuperable difficulties, except the inhumanity of detaining people in such a forbidding country, where water must be purchased by the carload, and all the necessities of life brought from Yuma by rail.

An effort was made to purchase water from a man by the name of Blaisdell, who had a pipe a few miles west of El Rio, but he would not

sell water for that purpose, and stated he intended taking up the pipe. The question was raised to locate the station on the Arizona side, and obtain water from a pipe owned by Mr. Blaisdell in that direction. He refused to sell water for that purpose. The citizens of Yuma were represented as being strongly opposed to such a station on the Arizona side of the river. In view, therefore, of the hardships to which passengers would be subject by even a short detention on the desert west of Yuma, we have determined to report against the location of a station on the desert, and would advise the stoppage of all persons sick with cholera, or suspected of having that disease, or liable to develop it soon by reason of recent infection, at the State line; and that entrance of all such persons into the State be denied until the Medical Inspector of the Board declare them to be no longer capable of carrying the infection.

The report was received and placed on file, and the recommendations adopted.

Dr. J. H. Davisson moved that all cholera patients and suspects coming to California, via Arizona, be stopped at the State line, and that the Secretary be instructed to communicate with Surgeon-General Walter Wyman, asking the United States Hospital Marine Service to take charge of quarantine matters at those points.

This motion was adopted; also another, instructing the Secretary to establish a station on the west side of the desert, at or near Banning, in case the Government should consent to assume charge at Yuma.

The Secretary applied for and was granted a three months' leave of absence from May 15th, with permission to leave the State, and on motion of Dr. C. W. Nutting, was instructed to continue the assistance of Dr. Elster until May 15th, and to obtain the necessary assistance and a substitute during his absence, at a compensation not greater than that received by him, to be paid out of the contagious disease fund.

The Secretary was instructed to pay all bills to be incurred in the holding of the Sanitary Convention at San Francisco, April 16th, and to employ a stenographer for the convention.

On motion of Dr. Anderson, it was resolved to adjourn from day to day, so as to visit San Quentin Prison, the Napa Asylum for the Insane, the Home for Feeble-Minded near Glen Ellen, and the State University and Home for the Deaf, Dumb, and Blind, at Berkeley.

The Board then adjourned until the following day.

APRIL 17, 1893.

The Board met in regular adjourned session to meet as a State Sanitary Convention at B'nai B'rith Hall, San Francisco, at 1:30 P. M.

All the members present, except Dr. P. C. Remondino.

The proceedings being lengthy, it was determined not to place them on the minutes, but to have them printed, the Secretary being instructed to have a sufficient number of copies printed and bound in pamphlet form.

Adjourned to meet at San Quentin the next day.

APRIL 18, 1893.

The Board met in regular adjourned session at San Quentin Prison. All the members present, except Dr. Remondino.

It was found that all the recommendations made by the Board at its last meeting had been put into force. The sanitary condition of the prison was as good as it could be made, with the existing conditions of an old site and ancient buildings. There was everywhere an air of neatness, and evidences of economy in management.

Adjourned until the next day to meet at Napa Insane Asylum.

APRIL 19, 1893.

Regular adjourned meeting of the Board. All the members present, except Dr. Remondino.

The Board proceeded to Napa, and visited the asylum, where it was found that all the recommendations made by the Board at its last visit had been carried into effect, so far as the Superintendent had authority, and that appropriations had been asked for and partly obtained by the Directors to complete the remainder. The institution was found in an excellent sanitary condition, and was declared to be, by the individual members of the Board, a credit to the State—not only in the buildings alone, but in its management. No recommendations were made.

Adjourned until the next day, to meet at the Glen Ellen Home for Feeble-Minded.

APRIL 20, 1893.

The Board met in regular adjourned session at Glen Ellen Home for Feeble-Minded. This institution has large grounds, with orchards and vineyards, and an ample water supply from a large spring some distance above the buildings, and piped into them.

There was every evidence of careful attention on the part of the management toward the defectives who are inmates of the home. The food and bedding are good, and the rooms were kept neat and the children clean. No adverse criticism was made with reference to the care of inmates, but the buildings received a full and well-merited condemnation.

No effort had been made to level the grounds around the buildings, and water had been permitted to run under the buildings, which could have been conducted away by a few hours' work with a shovel. The concrete floors, on the ground floor of the buildings, were everywhere badly sagged, and frequently cracked. This was said to be due to the settling by reason of water running under the buildings.

The floors above were of fourth-rate lumber, and totally unfit for the purpose. The plaster on the walls is so frail that the children have picked it off, it crumbling easily, leaving the laths bare and unsightly in places all around the dormitories and hall; also in the water-closets, where the patches are covered with rough boards. The water-closets are insufficient. There are in one ward two closets to accommodate seventy-four girls. There are no transoms over the doors into the halls, and these long halls are lighted by a window at each end. This is deemed insufficient, as there should be at least two or three skylights, for light and ventilation of the halls. One floor is so bad, having evidently been

laid green and of bad lumber, that putty has been used to fill the cracks. On the second story of what is known as the "Madrona Hall," is a room eighteen by twenty-four feet, containing two large wooden tanks. These should be placed outside of the building, if retained at all, and the room utilized as a dormitory, or for another purpose than housing tanks.

The dormitories, halls, and closets should be wainscoted without delay with good and durable material, and the water-closets increased everywhere, suitable to the requirements of the inmates. It is understood that an addition, or wing, is soon to be constructed, before the building is completed. Before the work is entered upon the plan should be submitted to competent authority, and before being accepted by the State should be inspected by the State Board of Health or other competent authority. To continue such work as has been done at Glen Ellen, will constitute an offense of greater magnitude than a mere scandal.

The Board adjourned to meet at Berkeley the following day.

APRIL 21, 1893.

The Board met in regular adjourned session at the State University at Berkeley. All the members were present, except Dr. Remondino.

The sanitary condition of all the buildings was found good. The water supply was reported as being insufficient during a portion of the year, but the requisite quantity was obtained elsewhere. The different departments were inspected under the agreeable escort of President Kellogg, and everywhere elicited the commendation of the Board.

The Asylum for the Deaf, Dumb, and Blind was next visited; but as this institution is noted for the perfection of its general appointments, nothing but favorable criticism could apply to its sanitary condition.

The Board then adjourned until July, or at the call of the President.

The regular quarterly session of the State Board of Health was held at the office of the Secretary, July 17, 1893, at 8:30 P. M.

Present: C. A. Ruggles (President), Drs. W. F. Wiard of Sacramento, Winslow Anderson of San Francisco, and Dr. L. A. Elster, acting Secretary pro tem.

On motion, the reading of minutes was omitted.

Dr. Anderson presented an outline of a paper prepared by him, giving simple and positive tests for water for drinking and culinary uses.

The President asked Dr. Wiard to take the chair.

Dr. Ruggles moved that the Secretary have ten thousand copies of the circular embodying Dr. Anderson's paper printed for distribution through usual channels. Motion carried without dissent.

The following correspondence was presented, as having been had in pursuance of instructions by the Board at the April session:

SACRAMENTO, April 24, 1893.

WALTER WYMAN, *Surgeon-General Marine Hospital Service, Washington, D. C.:*

SIR: I am instructed by the State Board of Health to ascertain what decision has been made with reference to governmental control of land quarantine between Territories and States. California deems it necessary, in the event of the landing of cholera on this continent, to make an attempt to stop it at the State line. There are four points where this should be done, and I will name them in the order of their importance:

Yuma, on the Colorado River, at crossing of the Southern Pacific Railroad; Needles, or the point of crossing of the Atlantic and Pacific Railroad. At both these points the State Board of Health have determined to prevent persons afflicted with cholera, or who have been so recently in contact with the disease as to merit the term of "suspects," from crossing the State line into California.

The necessity for such action is emphasized by the action of the people of Yuma, who have refused to permit us to establish a station at El Rio, on the west bank of the Colorado, or to allow us water from a pipe farther west, or to permit us to establish a station on the Arizona side. This gives us the alternative of stopping trains on the terrible desert west of Yuma, where there is neither water, wood, nor shelter, and to care for passengers and sick at an improvised camp in this inhospitable region, or stop all infected persons and cars at the State line, and let the Territory or the Federal Government assume the responsibility and expense of their care. Considerations of humanity lead us to choose the latter course, as nothing but the most extreme necessity would justify us in stopping passengers on the inhospitable Colorado desert.

We wish to know, therefore, if you will take charge at Yuma and Needles, and if we may depend on the Government covering these two points fully. In the event of your doing so, we will establish stations west of those points, and maintain them, so as to care for those who might pass the points in your charge, or develop the disease later, and with the exception of an Inspector, who would travel into Arizona daily, we would in nowise interfere, unless the work should be done in so lax a manner as to justify our fear. This is scarcely probable, and is not supported by the past history of the M. H. S.

I append herewith the law of the State concerning contagious diseases, and will add that under the general police laws of the State we have the right to go outside of the State, if necessary, provided we have the consent of those in authority.

The remaining points to be protected are the Nevada State line near Truckee, and the Oregon State line in the north. These points the health authorities of California will care for, and ask no aid from the Government. But the former, owing to their proximity to Mexico, and the distance across a sparsely settled country, offers in addition to the apparent hostility of the citizens, serious difficulties in the way of an effective land quarantine of our State.

Very respectfully,

J. R. LAINE, M.D.,
Secretary State Board of Health.

In reference to above communication, Dr. Wyman wrote as follows:

TREASURY DEPARTMENT,
 OFFICE OF THE SUPERVISING SURGEON-GENERAL
 MARINE HOSPITAL SERVICE, WASHINGTON, D. C., May 10, 1893.

J. R. LAINE, M.D., *Secretary State Board of Health, Sacramento, Cal.:*

SIR: I am in receipt of your letter of the 24th ultimo, with regard to the protection of the State of California from the introduction of contagious disease through the Arizona border, namely, at Yuma and The Needles.

In reply thereto, I have respectfully to state that there is a Marine Hospital officer on duty at Brownsville, Texas; that sanitary inspectors of the Marine Hospital Service are stationed at Laredo, Eagle Pass, and El Paso. These inspectors have been placed on duty with special reference to the introduction of typhus fever and smallpox, but should cholera be reported anywhere in Mexico, another inspector would be immediately appointed at Nogales. When this is done, all points of entrance into the United States from the Mexican border will have been covered, and it would seem as though the border line between Arizona and California would be protected by this line of inspectors. A special inspector will be placed on duty at Nogales at any time that a telegraphic request from you is received.

Respectfully yours,

WALTER WYMAN,
Supervising Surgeon-General, M. H. S.

Dr. Ruggles reported that in accordance with a suggestion by the General Manager of the Southern Pacific Railroad, Mr. A. N. Towne, he went to Yuma, Arizona, to confer with Dr. Goodfellow, of Tucson, who has been appointed Territorial Quarantine Health Officer. He was accompanied to Yuma by Dr. J. H. Davisson, of Los Angeles, member of this Board, and by Dr. M. F. Price, Health Officer of Colton.

In the conference it was agreed that in case of danger of introduction of cholera on that line a quarantine station should be established at or near Cabazon.

On motion of Dr. Anderson, the action of the President in this matter was fully indorsed by the Board.

On motion of Dr. Anderson, it was ordered that whenever the President of this Board is convinced that cholera has appeared anywhere on the land of the United States, the State of California shall be at once quarantined against it.

Dr. Ruggles resumed the chair.

A petition was presented asking the Board to appoint H. B. Marshall, of Los Angeles, State Inspector of Contagious Diseases among Animals.

After informal discussion it was ordered that at the present time it does not seem necessary to quarantine against any State or country, and the petition was placed on file.

OCTOBER 24, 1893.

Board met in regular session at Sacramento at 8 P. M.

Present: Drs. C. A. Ruggles, Winslow Anderson, W. F. Wiard, and J. R. Laine.

The minutes of the previous meeting were read and approved.

The Secretary was instructed to send invitations to sanitarians and medical men to prepare papers for the Sanitary Convention of 1894, and to issue a general invitation to attend, and was authorized to obtain the necessary assistance with which to carry out these instructions.

Dr. Wiard gave notice that he would at the next regular meeting introduce a resolution that the Board take action in an attempt to limit the spread of pulmonary consumption.

The Board then adjourned.

The Board met in regular quarterly session at the office of the Secretary at 7:30 o'clock P. M., January 15, 1894.

Present: Drs. Ruggles, Wiard, and Laine.

Letters were read from Drs. Davisson, Remondino, Nutting, and Anderson, stating good and valid reasons why they could not be present.

The Secretary was instructed to prepare and have printed a circular on school hygiene for the instruction of public school teachers. He was also authorized to procure the necessary assistance to arrange for the Sanitary Convention in April.

The Board resolved to urge all local Boards to exercise sanitary and hygienic control of school-houses and other public buildings.

Drs. Ruggles, Davisson, and Remondino were appointed to proceed to an inspection of Whittier School, San Bernardino Asylum, the United States quarantine station at San Diego, and the Normal School at Los Angeles, and make a report thereon.

The Board then adjourned, to meet at the call of the President.

The Board met in special session at the office of the Secretary at 3 P. M. March 12, 1894, at the request of the Secretary.

Present: President Ruggles, Drs. Wiard and Laine.

The purpose of the meeting was to perfect some plans to limit the epidemic of diphtheria on the Yolo side of the Sacramento River, below Sacramento.

The matter was left to the discretion of the Secretary, and the Board adjourned.

Regular meeting State Board of Health, held April 13, 1894, at the office of the Secretary.

Present: President Ruggles, Drs. Nutting, Wiard, and Laine.

Letters from Drs. Davisson and Anderson were read, showing inability to be present.

The Secretary reported having caused to be published a pamphlet on "School Hygiene for Public School Teachers," as directed by the Board at the January meeting, also that he had caused to be printed registers of births, marriages, and deaths, which the Secretary of State was distributing to the various County Auditors in the State. He reported also a large volume of correspondence with the different County Auditors and Clerks, who, in most instances, explained the neglect of registration to the apathy and indifference of the physicians.

The Secretary reported having completed a programme for the Second Annual Sanitary Convention, to be held at San José, April 16th, and that all arrangements had been made for the holding of the same on the date fixed.

Dr. Wiard presented his paper on the contagiousness of tuberculosis, which the Board approved.

On motion, the action of the Secretary in carrying out the various instructions of the Board as reported, was approved.

The Board then adjourned to meet at San José at 1:30 P. M., April 16th, and to adjourn from day to day until the work of the Board is completed.

The Board met in regular session at Germania Hall, San José, at 1:30 P. M., April 16th.

Present: Drs. Ruggles, Nutting, Wiard, Davisson, Anderson, and Laine, in attendance on the second annual Sanitary Convention.

A large number of attendants were present, and the convention continued in session until midnight, when an adjournment was had until 9 A. M., April 17th.

The Board met in adjourned session at 9 A. M., April 17th.

Present: Drs. Ruggles, Nutting, Davisson, Wiard, Laine, and Anderson.

A sanitary survey of the State Normal School at San José was then made, but its general sanitary condition was such that no recommendations were deemed necessary, and its condition was formally approved.

The Board then adjourned to meet at San Francisco, in order to proceed from there to an inspection of the Mendocino Asylum at Ukiah.

The Board met at San Francisco, on April 18, 1894.

Present: Drs. Ruggles, Nutting, Anderson, Davisson, Wiard, and Laine.

Drs. Ruggles, Davisson, Wiard, and Laine were instructed to proceed to an inspection of the Mendocino Asylum, and of the Clear Lake region in Lake County, and report, first, on the condition of the drainage at the asylum, and second, on the physical conditions of the Clear Lake regions with reference to its use as a summer resort and public sanitarium.

Dr. Nutting was appointed a committee to note all matters relating to public health that would arise in the progress of the transactions of the State Medical Society at San José.

Dr. Anderson was appointed to edit the transactions of the State Sanitary Convention.

Drs. Ruggles, Davisson, Wiard, and Laine then proceeded to Ukiah and inspected the Mendocino Asylum.

The conditions of the asylum, so far as the management is concerned, are in many ways commendable.

The buildings, though incomplete, are ample for the number of patients maintained at this time. The wards, kitchens, dining-rooms, laundry, bakery, and grounds are clean. The food supplies are of excellent quality, the vegetables are fresh, and the butter is sweet. The store-house is stocked with supplies of good quality.

The scullery should have a door cut down where the only window now is, to the floor, so that the garbage may be removed. A glass or screen door should be provided so that light may be obtained. A garbage cart with low wheels and a galvanized iron bed should be obtained for the easy and quick disposal of garbage from the scullery. At present the sole mode of egress and disposal is through a window facing south, where flies will be attracted in summer. A dark inclosure for the cart a few feet distant would, in a degree, remove the offense, but a galvanized iron cart body with lids for cover, and made to dump, will fill all necessities. This, if hosed down before return to the scullery, will remove all objection. At present all garbage is put into a barrel, which is lifted and wheeled away when full.

The car track in the basement should be continued eastward to the bakery and laundry, by cutting a way through the terrace to the basement of this combined building as bakery and laundry. This would make quick and easy transit between all parts of the asylum and the laundry, and from the bakery to the kitchen. Now all laundry material is brought by car to near the end of the building, where it is transferred to baskets and carried by hand to the laundry, and returned in the same way. The bread is also hauled in baskets instead of by car.

There should be an intercepting tiled drain sunk at the foot of the terrace from south to north, the entire length of the buildings now on the ground and of those contemplated, down to a depth corresponding to the foundation of the brick walls of the buildings. This would carry off the water that in the rainy season wells up from a stratum of quicksand that shows up at the south extremity of the terrace, making the roadway impassably miry, and threatens to dampen the floor of the basement by passing under the foundation walls of the buildings. This may be done at an expense much out of proportion to the benefit to be derived.

The disposition of the sewage of the asylum is a question of first importance. At present the method employed is of a temporary character, which may cause complaint if continued during warm weather.

The situation is, in the opinion of the Board, favorable for an inoffensive and efficient utilization of all the sewage from the asylum. This may be done by extending the 10-inch sewer from the northeast corner of the building grounds northerly to as high ground as it can be carried by natural fall, in the field lying north of the asylum buildings. At this point, which should be the highest ground capable of being reached, settling-tanks should be set in the ground, and the water drained off for

irrigation of the lands below. There is sufficient land suitable for irrigation purposes below the point where the tanks should be situated, to fully utilize all the water flowing from the tank, with no offense to the sight or smell of the inmates of the asylum, or to the people living in the vicinity. But the tanks and drains should, as far as practicable, be under ground to the point where the water leaves the drain for irrigation purposes. The solids may be shoveled out of the tanks and mixed with earth to form a valuable fertilizer. No chemicals should be used. This will be an economical and effective means of disposal of waste, and will equal in efficiency the best of any public institution in the State. But it should not be undertaken until a survey of the ground shall first be made, in order to ascertain the highest possible point for the location of the settling-tanks.

When the additional ward on the south side is built, the sewage from that division of the asylum may be conveyed southerly to a convenient and desirable point, and be treated and disposed of on the land in that direction. We believe this method will prove practicable and valuable.

The Board then proceeded by a private conveyance to Lakeport, in Lake County, by way of the Blue Lakes.

April 20th was spent in noting some of the natural conditions that have given this remarkable locality a common report favorable to health. Lake County takes its name from a broad lake of clear water resting in a great basin of mountains lightly fringed with timber. The stay of the Board was too brief to more than note a few of its chief and minor attractions. There lies to the northwest of the lake a fertile valley, which formed a part of the lake bottom at a period when its waters were higher than now. The land is deep loam, and grows enormous oaks to a towering height. There is also on the west side of the lake another stretch of level valley in the vicinity of Kelseyville, which is but a little above the level of the lake, and is a region of exceeding fertility. There are numerous spots of a few hundreds of acres of level land, but none of any considerable extent but these in Lake County, except in the region about Middletown, south of and removed from the lake. The lake is about 1,200 feet above the level of the sea. To reach it mountains have to be crossed at an elevation of 4,000 feet. The lake is clear, deep water, abounding with fishes. It is not uncommon to see large fishes swimming in the clear depths as the boat glides over the bosom of the water. It is irregular in outline, twenty-five miles in length, and eight miles at its widest part on a line from Lakeport easterly to Bartlett Springs landing.

The east side is steep, sloping quickly down to the margin of the lake, with a few hundred acres of flat land indented at intervals in the base of the mountain, where rich orchards thrive, and are mirrored on the placid waters in an accuracy of outline as sharply cut as if done in cameo. The mountains are also clearly reflected on so grand a scale as to startle the unaccustomed gazer. The west side of the widest part of the lake is crowned with a wooded ridge, upon which is admirably situated the town of Lakeport. Suddenly, the lake margin is flat tulle to the base of a towering volcano mountain, which rises something above 4,000 feet. This is commonly known as "Uncle Sam," and bars the lake abruptly on the south, forming, by projecting points of land, a bay on the northern base of the mountain. This is Soda Bay, where one eighth of a mile from shore, at the foot of a precipitous steep, there rises from

the midst of a mass of partly submerged igneous rocks, bubbling with gases, an enormous spring of warm mineral water, boiling from two to three feet above the surface of the lake. The water is sharp and quite agreeable to the taste, and is said to greatly resemble in its cleansing and refreshing qualities as a bath the waters of the famous springs near Ukiah. The waters of the springs at Ukiah are, for purposes of the bath, unrivaled in the world. This unqualified statement can only be appreciated and understood after trial.

The waters of the great spring in Soda Bay possess gaseous qualities, which is so marked a feature in the waters of the Ukiah Springs: that of forming small bubbles adherent to the skin of the body, almost enough to float it, creating a sensation metaphorically and not inaptly compared to a champagne bath—if any one knows what that is. The springs are situated over and contiguous to a mass of rocks, which might prove a sufficient foundation for suitable hotel and bath purposes, which accommodations will certainly be needed if the facilities for reaching this region should be improved.

The shore line trends abruptly to the east from this point to a narrow part of the lake, when it turns again to the south, where islands and points of land come to view projecting into the water from the main shore, making a scene of uncommon beauty. The time was too limited to survey the southernmost extremities of the lake.

There are climatic peculiarities which make this locality the most promising summer resort in California. During the morning and forenoon the wind blows from the east, across the mountains from the direction of the Sacramento Valley; during the afternoon and night the breeze is from the ocean—a distance in an air line of about seventy to eighty miles. In coming from the sea it first encounters a high coast range, the Mendocino Mountains, where it is deprived of its fogs and other irritating qualities; then it crosses the Russian River Valley, receiving warmth; then it rises over the range that intervenes between the Russian River Valley and Clear Lake, and which forms the westerly rim of the lake basin, which deprives it of any remaining humidity, so that when it falls into the Clear Lake basin, or valley, it is cool, dry, and refreshing, having lost in its passage the harsh neuralgia-breeding qualities of the coast breeze.

To those who live in the Sacramento and San Joaquin Valleys, the harshness of the coast wind is not infrequently a dangerous shock. A slightly higher altitude with a modified coast breeze is much better borne. Then again, the dweller in the cities need a summer climate free from miasm and mild enough to permit of wearing summer clothes. The one feature of prime value is the total absence of fog in winter and in summer. To many persons this is a climatic feature of no little importance, since the sunshine is an almost imperative necessity to their comfort and a mildly tonic air to their existence.

It is an agricultural region in the midst of charming mountain and lake scenery, of sufficient breadth and expanse not to tire the eye. The apple, pear, peach, apricot, fig, and orange grow in profusion, while the smaller fruits are produced in quantities. Enough is raised here to sustain a teeming population.

On the north shore of the lake were seen a few Indian huts, the remnants of the numerous savages that once inhabited this valley, living on

game and fish. A solitary dugout canoe, with two Indian fishermen, were all that were seen on this day.

The presence of numerous very valuable mineral springs in the vicinity of the lake, makes this magnificent sheet of water of necessity a central feature.

Highland Springs, with an almost inconceivable variety of mineral waters of incontestable virtues, are six miles west or southwest of Lakeport, on the stage road to Pieta. Great pains seem to have been taken by the management of the springs to insure the welfare and comfort of its numerous guests. Saratoga Springs, farther north, is a popular resort, while summer houses are opened on the Blue Lakes, to the northwest. The well-known Bartlett Springs lie twelve miles east of the lake at an elevation of 1,000 or more feet above the lake, while in the same vicinity are many others, which, while not enjoying the same degree of popularity, are believed, by their visitors, to possess great healing powers.

South and southwest from the lake are a great number of mineral springs, having a great variety of waters.

Perhaps in no equal geographical area in the known world is there an equal variety. But the visit to any of them, and to the Lake region, is a matter of great bodily endurance and physical discomfort. No matter from what direction, the approach must be by wagon or stage. The shortest route by stage from railroad is from Pieta, on the S. F. and N. P. R. R., to Lakeport, a five hours' ride up a good road of twenty miles on a 12 per cent grade, or twelve feet in the hundred feet. It is, however, the best road into the valley, and also the quickest from rail. If an entrance by rail could be effected into this unrivaled region, many pretty villas and summer houses would be erected on the margins of the beautiful lake, and few tourists would fail to visit the famed region and ride over the placid bosom of the water in the swift launches that are destined to play no subordinate part in the future pleasures of this spot.

A ride in a modern naphtha or electric launch, near the margins of this lake, is one of the pleasing experiences of life that is likely to be treasured in the recollection, to be involuntarily recalled from time to time, making one yearn to go back to an air that soothes and lulls the senses to a feeling of rest and restores rapidly the vigor of body and of mind.

The shores are in many places sand or gravel, shelving down into the water, making choice bathing places for pleasure seekers. Clumps of willows near the shore make an inviting shade. Malarial poison is a stranger to this region. This lake has no rival in California. Tahoe has a capricious climate, arctic in winter and sterile in summer. The Clear Lake region has a most charming summer and winter climate, with fertile surroundings. If it were placed within four or five hours by rail from San Francisco, it would at once and forever outrank all other summer resorts in the State, and maintain, through its superior natural attractions and advantages, its lead of any and all competitors, one may safely say, in the world. The entire region may be termed a natural sanitarium.

The Board returned to San Francisco. The Secretary was authorized to employ a typewriter to copy minutes and manuscript, and then adjourned to meet at the call of the President in June.

The Board met in special session, June 3d at 4 P. M.

Present: Drs. Ruggles, Wiard, Davisson, and Laine.

It being Sunday, no business was transacted, and the Board adjourned to meet at Folsom Prison on the following day.

JUNE 4, 1894.

The Board, composed of Drs. Ruggles, Davisson, Wiard, and Laine, visited the Folsom State Prison and inspected the prison grounds, kitchen, sewers, and general condition.

The sanitary condition of the prison was such as to meet the unqualified approval of the Board. Ventilation is perfect. The fall for drainage is sufficient. There is a new closet with 27 holes to be used by 700 people. These are set over a concrete trough, occupying three sides of a square inclosed with a fence only. The trough may be flushed as often as desired with an enormous volume of water. The floor is concrete also. The lavatory is supplied with an abundance of water, while a room 15x20 feet square, with concrete floor, is arranged for hot and cold shower baths. This does away with tubs, and is an effective and original plan devised by the Warden. The kitchens were in good condition, and the supplies in the store-room of good quality.

A new dining-room and kitchen is in contemplation. There is room and abundant material with which to construct additional accommodations for prisoners, and should be done, and the old prison at San Quentin abandoned. The matter of economical management is not for the consideration of the Board, but an abundance of water and water power, with building materials unlimited, will furnish out-of-door labor for many men, and are considerations of too great interest to the State to pass silently by. The two prisons might be consolidated to great advantage. Economy of administration alone would be reason enough, but putting aside such a consideration, and looking to the physical, mental, and moral influence, on prisoners only, of out-of-door work and sunshine, and the reasons are sufficient. A hard-handed, sun-burned man will find no trouble about getting work to do; but it is not so with the unfortunate prisoner whose hands are soft, whose muscles are flabby from long disuse, and whose pallor is a tell-tale of recent confinement.

JUNE 5, 1894.

The Board met in adjourned session at the room of the Section on State Medicine of the American Medical Association.

Present: Drs. Ruggles, Anderson, Nutting, Wiard, Davisson, and Laine.

The members participated in the proceedings and adjourned until the next day.

JUNE 6, 1894.

The Board again participated in the work of the Section on State Medicine.

All the members present except Dr. Remondino

JUNE 7, 1894.

The Board, composed of the same members as on the day previous, continued its work in the Section on State Medicine.

JUNE 8, 1894.

The Board proceeded to an inspection of the San Quentin Prison.

While the management is undoubtedly good, the supplies of excellent quality, the grounds and prison kept in a cleanly condition, yet the place is redolent of age and decay.

Everything about the place is an argument in favor of a new prison and an abandonment of the old. It cannot be conducted with economy. The water is acquired by purchase. Coal is purchased to create power for the jute mills, while water-power goes to waste at Folsom.

A moderate enlargement of accommodations at Folsom would render possible a consolidation of the two prisons under one management, and permit of the employment of nearly all of the men out of doors. This would keep them in a rugged condition, which would enable them to obtain out-of-door work upon the expiration of their terms.

The Board then met at the residence of Dr. Winslow Anderson. Dr. Ruggles reported having made examinations of diseased cattle at Stockton, and of having verified the disease by killing.

The following resolution, introduced by Dr. Davisson, was unanimously adopted:

Resolved, That the action of Dr. C. A. Ruggles in the inspection and killing of diseased cattle at Stockton be commended, and his course be declared worthy of imitation by other health officers in California.

Adjourned.

MONTHLY REVIEW OF DEATHS AND PREVAILING DISEASES.

Reported to the State Board of Health from July, 1892, to July, 1894.

[Reprinted from Monthly Circular of State Board of Health.]

JULY, 1892.

Mortality reports from 98 cities, towns, villages, and sanitary districts, having an aggregate population of 783,003, give 1,091 deaths from all causes during July. This corresponds to a death-rate of 1.39 per month, or 16.69 per annum.

There were 129 deaths due to consumption, 47 to pneumonia, 26 to bronchitis, 13 to congestion of the lungs, 24 to diarrhoea and dysentery, 53 to cholera infantum, 46 to other diseases of the stomach and bowels, 20 to diphtheria, 5 to croup, 9 to scarlatina, 1 to measles, 16 to whooping-cough, 23 to typhoid fever, 7 to malarial fevers, 6 to cerebro-spinal fever, 31 to cancer, 1 to erysipelas, 79 to diseases of the heart, 6 to alcoholism, and 544 to all other causes.

PREVAILING DISEASES.

Reports of prevailing diseases from 63 towns and districts outside of the larger cities show 11 cases of pneumonia, 76 of bronchitis, 4 of pleuritis, 1 of congestion of the lungs, 264 of diarrhoea, 58 of dysentery, 60 of cholera morbus, 50 of cholera infantum, 18 of inflammation of the bowels, 8 of diphtheria, 8 of scarlatina, 14 of measles, 32 of whooping-cough, 31 of la grippe, 29 of typhoid fever, 213 of malarial fevers, 3 of cerebro-spinal fever, 14 of erysipelas, 68 of rheumatism, 69 of neuralgia, 82 of tonsillitis, 7 of pharyngitis, 5 of inflammation of the brain, 1 of chickenpox, and 12 of inflammation of the kidneys.

AUGUST, 1892.

Mortality reports from 116 cities, towns, villages, and sanitary districts, having an aggregate population of 816,793, give 1,014 deaths from all causes during August. This corresponds to a death-rate of 1.24 per month, or 14.88 per annum.

There were 120 deaths due to consumption, 39 to pneumonia, 18 to bronchitis, 5 to congestion of the lungs, 22 to diarrhoea and dysentery, 47 to cholera infantum, 51 to other diseases of the stomach and bowels, 31 to diphtheria, 8 to croup, 12 to scarlatina, 2 to measles, 8 to whooping-cough, 36 to typhoid fever, 1 to remittent and intermittent fevers, 12 to cerebro-spinal fever, 47 to cancer, 4 to erysipelas, 95 to heart disease, 8 to alcoholism, and 448 to all other causes.

PREVAILING DISEASES.

Reports of prevailing diseases from 67 towns and districts outside of the larger cities show 9 cases of pneumonia, 53 of bronchitis, 13 of pleurisy, 2 of congestion of the lungs, 312 of diarrhoea, 60 of dysentery, 90 of cholera morbus, 72 of cholera infantum, 23 of diphtheria, 3 of croup, 23 of scarlatina, 13 of measles, 5 of smallpox, 26 of influenza, 51 of typhoid fever, 332 of malarial fevers, 5 of cerebro-spinal fever, 26 of erysipelas, 84 of rheumatism, 91 of neuralgia, 76 of tonsillitis, 11 of pharyngitis, 5 of mumps, 23 of inflammation of the bowels, and 10 of inflammation of the kidneys.

Measles prevailed at San Mateo, Hollister, Long Beach, and San Pedro. Whooping-cough was reported from Calistoga, Downey, Santa Monica, Fresno, Fresno Flats, San Mateo, Merced, and a few unimportant places, and was epidemic at Ventura, Hollister, and Santa Barbara. La grippe was observed in a number of localities.

SMALLPOX.—Five cases of smallpox were reported from National City, the contagion having come from Mexico by sea. Isolation and strict segregation with vaccination of all exposed persons were the means employed, which has completely prevented its spread.

August was what might be termed a healthy month. Diarrhoea prevailed to some extent, but bowel complaints are common during months when fruit ripens.

It is more difficult, however, to account for the number of cases of rheumatism, neuralgia, and tonsillitis, most of them reported from the driest portions of the State, unless the habit of sleeping out of doors during the warm weather may account for them. Otherwise, they would scarcely be expected in August.

ASIATIC CHOLERA.

As was announced in the June number, the cholera has effected a lodgment in Europe, and is punishing Hamburg for its sanitary sins.

Already in a dozen ships crowded with passengers it is pleading, urging, and threatening to land on our shores, and it seems almost impossible to maintain the rigid vigilance necessary to effectually exclude the unwelcome visitant. The situation is a serious one, and without wishing to criticise, we are led to wonder why the infected ships have not been sent back to Hamburg instead of being held in quarantine in New York harbor. Without a knowledge of international law governing in such matters, it would seem the easier way out of the dilemma, and would be more humane than keeping the well passengers cooped up with the infected ones in an infected ship. Their chances would be better even in Hamburg, where, at the worst, they could be detained on shipboard the same as here. But the protection of our own State is likely to require all the sanitary skill available. San Francisco harbor is protected by ample and well-equipped quarantine facilities, but San Diego has a site and an inspector only, with no disinfection apparatus. Shelter can be easily improvised if necessary, but an improved system of fumigation is not so hastily constructed. The quarantine station at Port Townsend is also merely a site with an officer in charge. The State Board has requested the Secretary of the Treasury to equip them at once with modern apparatus. Surgeon-General Wyman has responded that it would be done at once.

THE EFFICACY OF LAND QUARANTINE IN RESTRICTING AND PREVENTING CHOLERA.

It is the intention of the State Board of Health, as soon as the emergency arises, to establish refuge stations at the points of entry of railroads into the State, and to exhaust every resource authorized by the laws of the State to prevent cholera from passing our borders.

As much stress is laid by many on the value of land or interstate quarantine, it is deemed advisable to discuss the situation in some of its bearings to discover what such quarantine implies when called *absolute*, and what authority is given by the State laws to attempt it. This must not be construed into a plea for the abandonment or relaxation of any effort to prevent the ingress of cholera, but it is intended to put the people on their guard lest they depend more on quarantine than on cleanliness, and to show that the laws of the State will neither sanction nor supply the means for an *absolute* land quarantine. Let not the issue be clouded. It is against the practicability of *absolutism* that this is urged.

The prevalence of cholera in Europe and its presence in New York harbor, brings the people of California to a point where they must either adopt all the approved methods known to science to prevent its introduction and fatal spread among our people, or give free entry to the scourge and let it march unimpeded, spreading death and terror in its wake.

The only means to be employed to keep it out of the State when it has once invaded the continent, is by an absolute quarantine on sea and land. With the assistance of the Government it is not so difficult to do this at our ports; but it is a different matter to so effectually bar the way on the State borders that not even an infected dog may cross the line, nor a crow bring the infection across from an infected carrion on the other side. *Absolute* land quarantine must not be mistaken for practical quarantine.

Many well-informed people, without taking into account the available means with which to overcome the obstacles involved, jump at once to the conclusion that the State authorities could, if they would, absolutely exclude all people, clothing, baggage, mail, express goods, and freight from any suspicious locality from entrance into the State, until all had been put through a process of disinfection, fumigation, and cleansing. Enthusiastic medical men of limited experience also proclaim the ease with which land quarantine can be made absolutely effective. They fail, however, to point out any instances where such ideal land quarantine has proved sufficient to exclude the pest. Their answer is that failure was due to the fact that the quarantine was not absolute. Upon that statement alone any one pleading against the possibility of an absolute land quarantine on the thousand miles of California border could rest his case.

If it be practicable to stop all trains on the Oregon, the Central Pacific at Truckee, the Atlantic and Pacific at Needles, and the Southern Pacific at Yuma, and compel every man, woman, and child, with baggage and freight, to be washed and fumigated, the mail and express matter to be effectually disinfected, and a change of cars made, without any escaping the ordeal, the quarantine might be called effectual; but it would be far from absolute, for measures could scarcely be taken to prevent a passenger from getting off a train before reaching the quarantine station, and riding or walking around it into the State. The enthusiasts will say, place a *cordon militaire* not only around the passengers detained at a refuge station, but along the entire State border, from the ocean on the north along the Oregon border, along the crest of the Sierras, the Nevada border, along the Colorado River, along the Arizona border, then along the Mexican line on the south to the ocean, below San Diego. We might, indeed, feel secure if the State was capable of placing sentinels along its lines so that no loophole could be found to let in the germs of cholera. It might require all the soldiers in the United States service, but nevertheless it would prove that it could be done. Other States might want the same soldiers to patrol their State lines, but in some way, not yet explained, California will be supposed to have obtained a prior claim to them.

This is a picture of absolute land quarantine. Nothing can be more so than to prohibit persons and effects of all kinds whatsoever from passing across our State lines. To prevent them from crossing it is necessary to place a sufficient guard along the whole line. Before the days of railroads people found a way into California, and people have not yet forgotten how to travel without a locomotive.

Will any reflecting person declare practicable the placing of an *absolute* land quarantine along the California border?

The Legislature has defined the powers of the State Board of Health in Section 2979 of the Political Code. It reads as follows:

"An Act to prevent the introduction of contagious and infectious diseases into the State of California.

"Railroad cars to be inspected.

"SECTION 1. Whenever there shall exist, in the opinion of the State Board of Health, imminent danger of the introduction of contagious and infectious diseases into the State of California, by means of railroad communication with other States, the said State Board of Health are authorized, and it is hereby made their duty, to make, or cause to be made, by an accredited agent or inspector, an inspection of all rail cars coming into the State at such point, or between such points within the State limits as may be selected for the purpose.

"Detention of train a minimum.

"SEC. 2. Such inspection shall be made, where practicable, during the ordinary detention of a train at a station, or while in transit between stations, and in all cases shall be so conducted as to occasion the least possible detention or interruption of travel, or inconvenience to the railroad companies, so far as consistent with the purposes of this Act.

"Infected cars to be side-tracked.

"SEC. 3. Should the discovery be made of the existence among the passengers of any case or cases of dangerous, contagious or infectious disease, the said Board of Health, or their agent or inspector, under rules and conditions prescribed by them as applicable to the nature of the disease, shall have power to cause the side-tracking or detention of any car or cars so infected; to isolate the sick or remove them to a suitable place for treatment; to establish a suitable refuge station; to cause the passengers and materials in such infected car to be subjected to disinfection and cleansing before proceeding farther into the State, and in case of smallpox to offer free vaccination to all persons exposed in any car or at any station."

It will be noticed that the above Act does not authorize the State Board to attempt anything like an absolute quarantine.

The greatest enthusiast, who has not yet shaken off the notion of absolutism imbibed

in foreign despotisms, will find but little in the law authorizing and empowering the sanitary officials of the State to attempt an *absolute* inhibition of travel and traffic, or to attempt to guard the State lines. While the attempt has been made in countries where militarism was most *absolute*, the result has never proven it to be sufficient. The military have been unable to prevent dogs from crossing their lines; cats have sneaked across in the night from an infected hovel on the other side; pigeons, crows, ravens, vultures, and other birds have flown across; water charged with the germs has run down hill across the sentinel's path, to slake the thirst of its victim on the other side.

These by no means impossible methods of getting cholera across the lines of a *cordon militaire* seem to be ignored by those who would allay public apprehension, by preaching the doctrine of an absolute and impenetrable land quarantine.

This is the character of barrier they would place around the State, instead of inculcating, by precept and example, the doctrine of personal, domestic, and municipal cleanliness.

If the people of California allow themselves to be lulled into a feeling of inactive security through confidence in the efficacy and sufficiency of an interstate land quarantine, maintained in the most rigorous manner, sanctioned by the police power of the State, and enforced by all the means at her disposal, they will commit a most serious error.

Such a quarantine will certainly be made and maintained with a sternness that would appall the impractical idealist by its inflexibility, but as has been shown above, even the domestic animals may carry the germs across the line, and a pig may root in an infected garbage pile and unconsciously thwart the theory of the believer in the practicability of an absolute land quarantine, by carrying it across the line.

What immunity have the people then from the much-dreaded cholera? None at all, except that which is with certainty obtained by cleanliness. This, it will be urged, is impracticable in some quarters. Clean up your own premises, then; clean the well; empty and disinfect the cesspool and privy vault; cleanse the house drains; allow no garbage heaps on your premises; ventilate your basements, and you have made an excellent beginning. Then get your neighbor to do the same, and get the town, village, or city authorities to adopt like measures. A town, like a private house, has a source of water supply to look after and a sewer system with a place of discharge. It has its slaughter-houses and glue factories, its crowded tenement houses, and festering plague spots. Create a sentiment in your community to remove them. No matter if your neighbor has a vested interest in those nuisances, he has no right to use his property in a way to endanger others.

Look to your local Health Boards and back them in their efforts to place your town in a condition to resist the invader by depriving him of subsistence. Starve the cholera. It cannot exist and propagate without some form of filth to breed in. Destroy the filth, allow none to accumulate, drink boiled water, and eat cooked food, and your chances of taking cholera will be so small it need not be taken into account. Become a disciple of land quarantine sufficiency, and retain your accustomed domestic and municipal nuisances, and you will furnish the destroyer a harvest that will fatten the earth with moldering human flesh. It is for the people to choose whose advice they will follow in this emergency.

It is better to be prepared for the worst. Persons having a slight diarrhoea will conceal the fact and pass the Inspector, and yet the discharges may contain the germs of cholera, and be scattered along the line of railroad to infect others. The infectious germs once arrived in a locality will never be able to do any damage if they do not meet with a soil favorable for their reproduction.

Pay no heed, then, to those emotional persons who theorize on the practicability of absolute land quarantine, but become a disciple and a follower of cleanliness and purity. The State Board has authorized the publication of a circular on "Cholera; its Restriction and Prevention," for general distribution. It is designed both for the medical profession and the people.

COUNTY HEALTH OFFICERS.

It is believed that the County Supervisors could do no better than appoint a competent and energetic physician as County Health Officer to supervise the sanitary condition of all public buildings and small hamlets that have no health officer, and to abate all nuisances outside of corporate limits. This is no time for parsimony and niggardliness in expenditures. The epidemic once here, the ones who now express contempt for it will be the first to run away. A number of small towns have shown commendable activity in preparation for what may come.

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ABSTRACT FOR AUGUST, 1892—Continued.

Other Causes	5	1	4	1	10	7	1	9	1	1	1	1	1	1	1	1	1	10	1	4	3	5	1
Alcoholism																							
Heart Diseases			1		2	1				1					2	1				1		4	1
Erysipelas															1	1				1			
Cancer			1																1				1
Cerebro - Spinal Fevers																							
Remittent and Intermittent Fevers																							
Typhoid Fever									1									1		2		2	
Typho - Malarial Fever																							
Whooping-Cough						1													1				
Smallpox																							
Measles																							
Scarlet Fever																							
Croup																							
Diphtheria		1						1															
Other Diseases of St'mach & Bow'ls		1		1														2					
Cholera Infantum		3			1		2																2
Diarrhoea and Dysentery		1													1	1							
Congestion of the Lungs																							
Acute Bronchitis																							
Acute Pneumonia																							
Consumption																							
Total Deaths	11	0	2	7	1	14	0	13	3	4	1	3	1	2	4	2	1	17	4	2	0	11	1
Estimated Population	3,000	2,500	1,500	3,800	2,000	10,000	1,000	5,864	2,887	10,000	5,216	2,000	1,750	1,200	5,468	3,000	500	1,000	1,000	1,000	1,000	14,378	2,800
San Luis Obispo																							
San Mateo																							
San Pedro																							
San Rafael																							
San Leandro																							
Santa Ana and vicinity																							
Santa Maria																							
Santa Barbara																							
Santa Clara																							
Santa Cruz and vicinity																							
Santa Rosa																							
Santa Paula and vicinity																							
Santa Monica																							
Sausalito																							
Sutter County																							
Selma and vicinity																							
Sebastopol																							
Sierra City																							
Sierra Valley																							
Sisson																							
Solano County, District No. 2																							
Soledad																							
Stockton																							
St. Helena and vicinity																							
Soquel																							
North Temescal																							
Templeton																							
Truckee and vicinity																							
Tulare and vicinity																							
Upper Lake																							
Vallejo																							
Ventura and vicinity																							
Vacaville and vicinity																							

[illegible]

SEPTEMBER, 1892.

Mortality reports from 119 cities, towns, villages, and sanitary districts, having an aggregate population of 838,163, give 965 deaths from all causes during September. This corresponds to a death-rate of 1.15 per 1,000 per month, or 13.80 per annum.

There were 132 due to consumption, 39 to pneumonia, 9 to congestion of the lungs, 23 to bronchitis, 20 to diarrhoea and dysentery, 38 to cholera infantum, 53 to other diseases of the stomach and bowels, 30 to diphtheria, 10 to scarlatina, 1 to smallpox, 9 to whooping-cough, 24 to typhoid fever, 9 to malarial fevers, 9 to cerebro-spinal fever, 27 to cancer, 2 to erysipelas, 72 to diseases of the heart, 6 to alcoholism, and 438 to all other causes.

PREVAILING DISEASES.

Reports of prevailing diseases from 73 towns and districts outside of the larger cities show 16 cases of pneumonia, 104 of bronchitis, 16 of diarrhoea, 94 of dysentery, 124 of cholera morbus, 91 of cholera infantum, 28 of diphtheria, 9 of croup, 32 of scarlatina, 17 of measles, 2 of smallpox, 51 of whooping-cough, 66 of influenza, 80 of typhoid fever, 368 of malarial fevers, 27 of erysipelas, 106 of rheumatism, 11 of cerebro-spinal fever, 109 of neuralgia, 92 of tonsillitis, 14 of pharyngitis, 18 of inflammation of the bowels, and 16 of inflammation of the kidneys.

September was a healthy month. There was an absence of epidemic disease, and the autumn weather over the entire State has been delightful, though above normal in temperature for September.

SMALLPOX.

A case of smallpox was reported from Red Bluff, in a woman who came from British Columbia by water. Isolation of the patient, with vaccination of all persons believed to have been exposed, proved sufficient to prevent its spread. The patient is dead. Another was reported in Oakland. In this case the contagion came by water from Mexico. The same precautions led to like results as in the first case, and the patient is discharged, with no spread of the disease.

ASIATIC CHOLERA.

The United States is to be congratulated on its escape from the cholera this year. New York City is to be complimented upon its successful effort to repress the invasion of the pest. The approach of winter made the efforts great and efficient as they were, successful. The same efforts made in the last week of June might not result so favorably. We may hope that the rigors of a severe winter will put an end to the march of the epidemic, but it must be remembered that it has wintered in Russia and broken out in the spring. It is but logical to infer that it can only reach us next summer as a foreign importation. If it effects a lodgment on our shores in the early summer, it will in all probability spread over the continent. The efforts that have been made to place our habitations in good sanitary condition will not be lost, even if cholera does not come. The result will be observed for many months in a lessened death-rate from diphtheria, typhoid, and other fevers and minor ailments that arise from breathing emanations from decomposing animal and vegetable matter. The villages and smaller towns should, during the coming winter, while the ground is moist, improve their drainage. Very little effort in that direction has been made outside of the cities in California. In summer, while the ground is hard and dry, and the people engaged in agricultural pursuits, little is ever done in the way of such improvements. But no excuse can be advanced for not doing this work in the rainy months of winter, when there are idle hands enough to complete all that need be done to place many of the small towns in perfect sanitary condition. Many beautiful hamlets, and some summer resorts, have no means provided for drainage, or have no sewers, and all refuse matter and house drainage are allowed to soak into the ground. It will be a paying investment to make all needed improvements of this character during the winter, and everywhere abandon as nearly as possible the abominable cesspool system. People living in the country towns may profitably bear in mind that in case of a cholera epidemic the residents of cities will flee to the country and spread the contagion, and that small places not infrequently suffer in greater proportion than the larger towns. As a matter of economy a good system of sewers in a country village is always a paying investment. It acquires a reputation for salubrity, and induces the location of people of wealth and refinement, the building up of industries, and a rapid increase of population and enhancement in real estate. No sensible man will spend much money in beautifying a home where he cannot count on an ample supply of pure water and pure air. Pure air cannot be obtained around human habitations where there are no means for the speedy removal of all refuse matter or waste, whether fluid or solid.

REPORT OF THE STATE BOARD OF HEALTH.

[illegible]

ABSTRACT FOR SEPTEMBER, 1892—Continued.

Other Causes	2	1	1	1	1	2	438
Alcoholism							6
Heart Diseases							72
Erysipelas							2
Cancer							27
Cerebro - Spinal Fevers							9
Remittent and Intermittent Fevers						1	9
Typhoid Fever			1	1		1	24
Typho - Malarial Fever							
Whooping-Cough	2						9
Smallpox							1
Measles							0
Scarlet Fever		1	1				20
Croup							10
Diphtheria		2					30
Other Diseases of St'mach & Bow'ls							53
Cholera Infantum			1			1	38
Diarrhoea and Dysentery							20
Congestion of the Lungs							9
Acute Bronchitis			1				23
Acute Pneumonia							39
Consumption	1						132
Total Deaths	5	0	4	2	2	0	965
Estimated Population	9,000	4,500	2,500	1,000	3,000	500	838,169
Ventura and vicinity							
Vacaville and vicinity							
Watsonville and vicinity							
Wheatland							
Willows and vicinity							
Williams							
Woodbridge							
Woodland							
Totals							

OCTOBER, 1892.

Mortality reports from 111 cities, towns, villages, and sanitary districts, having an aggregate population of 808,603, give 959 deaths from all causes in October. This corresponds to a death-rate of 1.18 per 1,000 for October, or 14.16 per 1,000 per annum.

There were 117 due to consumption, 46 to pneumonia, 25 to bronchitis, 2 to congestion of the lungs, 29 to diarrhoea and dysentery, 38 to cholera infantum, 67 to other diseases of the stomach and bowels, 21 to diphtheria, 15 to croup, 18 to scarlatina, 1 to measles, 3 to whooping-cough, 41 to typhoid fever, 6 to malarial fevers, 1 to cerebro-spinal fever, 35 to cancer, 2 to erysipelas, 73 to diseases of the heart, 8 to alcoholism, and 411 to all other causes.

PREVAILING DISEASES.

Reports of prevailing diseases from 73 towns and sanitary districts outside of the large cities show 36 cases of pneumonia in October, 25 of pleurisy, 12 of congestion of the lungs, 161 of bronchitis, 292 of diarrhoea, 49 of dysentery, 76 of cholera morbus, 42 of cholera infantum, 57 of diphtheria, 13 of croup, 41 of scarlatina, 7 of measles, 34 of whooping-cough, 94 of influenza, 69 of typhoid fever, 365 of malarial fevers, 22 of erysipelas, 133 of rheumatism, 1 of cerebro-spinal fever, 89 of neuralgia, 161 of tonsilitis, 12 of pharyngitis, 18 of inflammation of the bowels, and 11 of inflammation of the kidneys.

October has added another to the lists of healthy months. There has been no considerable prevalence of any contagious disease. The temperature for the month was above normal. This is shown in the number of cases of diarrhoea and cholera morbus reported. The cool nights, with a rapid radiation of heat from the earth's surface, gave, as a result of sudden changes of temperature, many cases of tonsilitis, and have, no doubt, had an influence on the number of cases of rheumatism reported. Ninety-four cases of la grippe would argue that we are still entertaining that unwelcome guest, and it is quite reasonable to expect a renewal of activity of the epidemic with the approach of winter weather. It would be interesting to ascertain with certainty a large number of cases where persons are known to have had more than one attack. This may be done during the approaching winter, so as to dispel all possible doubt on the subject.

REPORT OF THE STATE BOARD OF HEALTH.

ABSTRACT FOR OCTOBER, 1892—Continued.

Other Causes	8	9	3	1	4	4	3	1	3	1	1	6	3	2	2	1	3	1
Alcoholism	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Heart Diseases	1	1	1	1	1	1	1	1	1	1	2	2	2	2	1	2	1	1
Erysipelas	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Cancer	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Cerebro - Spinal Fevers	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Remittent and Intermittent Fevers	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Typhoid Fever	1	1	1	1	4	4	1	1	1	1	1	1	1	1	1	2	1	1
Typho - Malarial Fever	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Whooping-Cough ..	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Smallpox	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Measles	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Scarlet Fever	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Croup	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Diphtheria	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Other Diseases of St'mach & Bow'ls	1	1	1	1	1	1	1	2	1	1	1	1	1	1	2	1	1	1
Cholera Infantum ..	3	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1
Diarrhoea and Dysentery	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1
Congestion of the Lungs	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Acute Bronchitis ..	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Acute Pneumonia ..	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1
Consumption	3	1	1	1	2	2	1	1	1	1	3	2	2	2	1	1	1	1
Total Deaths	19	12	4	3	14	7	0	5	7	1	1	1	1	1	1	1	1	1
Estimated Population	18,027	5,000	2,000	2,500	1,500	3,891	15,000	5,864	1,000	2,887	10,000	5,216	2,000	1,750	1,200	5,469	3,000	1,000
San José	18,027	5,000	2,000	2,500	1,500	3,891	15,000	5,864	1,000	2,887	10,000	5,216	2,000	1,750	1,200	5,469	3,000	1,000
San Luis Obispo	5,000	2,000	2,500	1,500	3,891	15,000	5,864	1,000	2,887	10,000	5,216	2,000	1,750	1,200	5,469	3,000	1,000	1,000
San Leandro and vicinity	2,000	2,500	1,500	3,891	15,000	5,864	1,000	2,887	10,000	5,216	2,000	1,750	1,200	5,469	3,000	1,000	1,000	1,000
San Mateo	2,500	1,500	3,891	15,000	5,864	1,000	2,887	10,000	5,216	2,000	1,750	1,200	5,469	3,000	1,000	1,000	1,000	1,000
San Pedro	1,500	3,891	15,000	5,864	1,000	2,887	10,000	5,216	2,000	1,750	1,200	5,469	3,000	1,000	1,000	1,000	1,000	1,000
San Rafael	3,891	15,000	5,864	1,000	2,887	10,000	5,216	2,000	1,750	1,200	5,469	3,000	1,000	1,000	1,000	1,000	1,000	1,000
Santa Ana and vicinity	15,000	5,864	1,000	2,887	10,000	5,216	2,000	1,750	1,200	5,469	3,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Santa Barbara	5,864	1,000	2,887	10,000	5,216	2,000	1,750	1,200	5,469	3,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Santa Maria	1,000	2,887	10,000	5,216	2,000	1,750	1,200	5,469	3,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Santa Clara	2,887	10,000	5,216	2,000	1,750	1,200	5,469	3,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Santa Cruz and vicinity	10,000	5,216	2,000	1,750	1,200	5,469	3,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Santa Rosa	5,216	2,000	1,750	1,200	5,469	3,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Santa Paula and vicinity	2,000	1,750	1,200	5,469	3,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Santa Monica	1,750	1,200	5,469	3,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Sausalito	1,200	5,469	3,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Sutter County	5,469	3,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Seima and vicinity	3,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Sierra Valley	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Stockton	14,376	12	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
St. Helena and vicinity	2,800	400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Susanville	2,800	400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Susana	400	250	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Sequel	250	3,000	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
North Temescal	3,000	350	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Tehama	350	1,300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Truckee and vicinity	1,300	4,000	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Tulare City and vicinity	4,000	300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Upper Lake	300	6,000	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Vallejo	6,000	4,500	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Vacaville and Elmira	4,500	2,500	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Watsonville and vicinity	2,500	1,000	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Wheatland	1,000	1,000	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

NOVEMBER, 1892.

Mortality reports from 103 cities, towns, villages, and sanitary districts, having an aggregate population of 793,693, give 1,087 deaths from all causes in November. This corresponds to a death-rate of 1.36 per 1,000 per month, or 16.32 per annum.

There were 172 deaths due to consumption, 87 to pneumonia, 31 to bronchitis, 15 to congestion of the lungs, 18 to diarrhoea and dysentery, 20 to cholera infantum, 59 to other diseases of the stomach and bowels, 30 to diphtheria, 17 to croup, 18 to scarlatina, 5 to whooping-cough, 36 to typhoid fever, 2 to malarial fevers, 8 to cerebro-spinal fever, 40 to cancer, 3 to erysipelas, 94 to diseases of the heart, 7 to alcoholism, and 427 to all other causes.

PREVAILING DISEASES.

Reports of prevailing diseases from 67 localities outside of the large cities, show 63 cases of pneumonia, 13 of congestion of the lungs, 158 of bronchitis, 37 of pleurisy, 188 of diarrhoea, 34 of dysentery, 27 of cholera morbus, 13 of cholera infantum, 46 of diphtheria (28 of which were reported from Lodi), 12 of croup, 38 of scarlatina (it being reported epidemic at Elk Grove), 2 of measles, 1 of smallpox, 51 of whooping-cough, 119 of la grippe, 71 of typhoid fever, 214 of malarial fevers, 23 of erysipelas, 106 of rheumatism, 12 of cerebro-spinal fever, 75 of neuralgia, 151 of tonsilitis, 28 of pharyngitis, and 48 of enteritis.

San Rafael and Ventura report an epidemic of whooping-cough, and Azusa reports la grippe epidemic. Fresno reports a case of leprosy, cared for in the county pest-house. No history of the case has been given. A case of confluent smallpox was reported by Dr. B. T. Mouser, of North Temescal, the following letter being self-explanatory. There is some doubt, however, as to the disease having been contracted at Fresno, as the disease has not been reported from that point for many months:

"NORTH TEMESCAL, November 30, 1892.

"J. R. LAINE, M.D.:

"DEAR DOCTOR: The case of smallpox in this locality was in all probability contracted in Fresno, though the stage of incubation must have been unusually long. I have investigated the premises where the patient had been stopping for some days before going to the Fabiola Hospital, and fumigated the same. This case has no connection with those in Oakland, under quarantine, and believed by many to be chickenpox. Patient reported by me is one of the confluent type, and is being treated by Dr. Johnson, County Physician. Every precaution is being taken to prevent spread of the disease; but the school trustees have not had vaccination in this district for many years, though I have drummed them up repeatedly.

"Yours, etc.,

"B. T. MOUSER.

A copy of the Twelfth Biennial Report of the California State Board of Health has been sent to each local Board of Health. In addition to a synopsis of the sanitary work of the past two years, it contains the sanitary laws of the State. This to local Boards will constitute its chief value, as it will be found useful for ready reference in matters relating to sanitary affairs. If Secretaries of local Boards will forward the names and addresses of the members of their Boards a copy will be forwarded to each. They will also be sent to any one else who applies for a copy.

ABSTRACT FOR NOVEMBER, 1892—Continued.

Other Causes	2	1	2	1	3	—	—	1	1	1	1	1	25	2	2	—	2	1	—	1	1	1	18	1	1	4	—	1					
Alcoholism	1	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—					
Heart Diseases	—	—	—	—	1	—	—	—	—	—	—	1	5	—	—	—	1	—	—	—	—	9	2	1	1	—	—	—					
Erysipelas	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—					
Cancer	—	1	—	—	1	—	—	—	—	—	—	—	3	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—					
Cerebro - Spinal Fevers	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—					
Remittent and Intermittent Fevers	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	1	—	—	—	—					
Typhoid Fever	1	—	—	1	3	—	—	—	—	—	1	4	—	—	—	—	—	1	—	—	—	1	—	—	—	—	—	—					
Typho - Malarial Fever	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—					
Whooping-Cough	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	—	—	—					
Smallpox	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—					
Measles	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—					
Scarlet Fever	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	—	—	—	—	—	—	1	—	—	—	—	—	—					
Croup	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—					
Diphtheria	—	—	1	—	—	—	—	—	—	—	2	—	—	—	—	—	—	—	—	—	—	1	—	—	—	1	—	—					
Other Diseases of St'mach & Bow'ls	3	1	—	—	—	—	—	1	—	—	—	6	—	—	—	—	—	—	—	—	3	1	—	—	1	—	—	—					
Cholera Infantum	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—					
Diarrhoea and Dysentery	—	—	—	—	—	—	1	—	—	—	1	5	—	—	—	—	—	—	—	1	1	1	—	—	—	—	—	—					
Congestion of the Lungs	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—					
Acute Bronchitis	—	—	—	—	—	—	—	—	—	1	3	—	—	—	—	—	—	—	—	—	—	3	1	—	—	—	—	—					
Acute Pneumonia	1	—	—	1	—	—	—	—	1	—	1	7	—	—	—	—	—	—	—	—	1	2	—	—	—	2	—	—					
Consumption	6	—	1	—	—	—	—	—	—	—	—	14	—	—	—	—	—	—	—	—	—	9	—	—	—	—	—	—					
Total Deaths	12	3	6	2	3	9	0	3	2	1	7	2	2	4	0	1	2	1	1	2	3	3	3	3	13	4	1	—					
Estimated Population	12,000	1,980	7,000	500	2,500	700	3,500	2,000	936	250	500	2,000	1,250	1,100	1,500	65,000	6,000	2,009	300	1,000	2,800	6,000	1,200	3,000	3,000	350	60,000	1,000	2,000	10,000	1,884	5,000	400
	Fresno	Folsom	Grass Valley and vicinity	Gonzales	Glendora and vicinity	Girdley	Haywards	Hollister	Hanford	Knights Ferry	Lockeford	Long Beach and vicinity	Lincoln	Lakeport	Lodi and vicinity	Los Angeles	Marysville	Merced	Middletown	Monrovia	Monterey	Napa	National City	Nevada City	North Temescal	North Bloomfield	Oakland	Oakdale	Ontario and vicinity	Pasadena and vicinity	Placerville and vicinity	Pomona and vicinity	Pope Valley

Pleasanton.....	800	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
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DECEMBER, 1892.

Mortality reports from 108 cities, towns, villages, and sanitary districts, having an aggregate population of 818,764, give 1,155 deaths from all causes in December. This corresponds to a death-rate of 1.41 per thousand, or 16.92 per annum.

There were 189 due to consumption, 134 to pneumonia, 51 to bronchitis, 6 to congestion of the lungs, 14 to diarrhœa and dysentery, 14 to cholera infantum, 50 to other diseases of the stomach and bowels, 27 to diphtheria, 15 to croup, 9 to scarlatina, 1 to smallpox, 2 to whooping-cough, 24 to typhoid fever, 3 to cerebro-spinal fever, 40 to cancer, 1 to erysipelas, 100 to diseases of the heart, 8 to alcoholism, 1 to la grippe, and 467 to all other causes.

Zymotic diseases caused 1.48 per cent of all the deaths during the month. December compares favorably with the corresponding month of the past three years. In December, 1890, the death-rate per 1,000 of the population was 1.67, in December, 1891, 2.19 per 1,000, while the past month reached but 1.41 per 1,000. One death from smallpox was reported from Temescal.

Dr. D. W. Mott, of Santa Paula, reported but one death from his locality. It occurred in a female native of the Atlantic States, aged 103 years. He added in parenthesis the information that she had both smoked and chewed tobacco since 16 years of age.

PREVAILING DISEASES.

Reports of prevailing diseases from 70 towns and sanitary districts outside of the large cities show 75 cases of pneumonia, 229 of bronchitis, 49 of pleurisy, 6 of congestion of the lungs, 134 of diarrhœa, 36 of dysentery, 28 of cholera morbus, 5 of cholera infantum, 38 of diphtheria, 15 of croup, 33 of scarlatina, 126 of measles, 6 of smallpox, 39 of whooping-cough, 250 of influenza, 46 of typhoid fever, 272 of malarial fevers, 9 of cerebro-spinal fever, 29 of erysipelas, 129 of acute rheumatism, 126 of neuralgia, 162 of tonsillitis, and 18 of pharyngitis. Diarrhœa was very prevalent in the vicinity of Napa in the early part of the month, without an ascertained cause. Scarlatina was reported epidemic at Elk Grove, while whooping-cough was quite prevalent at Merced and Rocklin. La grippe was reported from thirty-two localities, in some as epidemic; but it is known to have been quite generally distributed throughout the State, though in a milder form than observed during the last two winters. In several of the localities it was reported epidemic.

Three cases of smallpox were reported from San Francisco. The origin of the disease could not be determined. The preventive measures adopted were strict quarantine by removal to smallpox hospital, the vaccination of all exposed persons, and disinfection of premises occupied by the patients, where discovered. Another case is reported, from Fresno, as being a patient in the pest-house, with all precautions taken. Dr. E. S. O'Brien, of Merced, reported that Dr. Castle, of his city, had informed him that he had attended a case thirty miles east of that place, in Mariposa County. No further particulars have been obtained. Another case has been reported at Swingle Station, ten miles west of Sacramento, very recently; source of contagion unknown. Strict seclusion and vaccination of exposed persons are the measures that have been adopted.

A resolution in force makes it obligatory on the Secretary of the State Board of Health to promptly notify the secretaries of all other State and Provincial Boards of Health of any cases of smallpox in the State, the object being to restrict the disease to the narrowest possible limits. The Code provides for notification of all dangerous contagious or infectious diseases by local Boards of Health. Prompt reports of localities, source, and measures taken, will enable the Secretary to comply with the provisions of the resolution with reference to each case of smallpox.

Now is a good time to vaccinate. The contemplation of the probabilities of an epidemic of cholera during the coming summer should not dull our sensibilities concerning other necessities. With several points in the interior of the State for smallpox to start from, it is quite probable that it will spread to some considerable extent before it can be stamped out. Too much energy cannot be employed in this direction.

Abstract of the Reports of Deaths and their Causes in the following Cities and Towns of California during December, 1892.

Other Causes	8	1	1	1	2	1	1	1	2									5	2	2	1	1	1	4		4		1	3				
Alcoholism.....									1																								
Heart Diseases	1			1																1											1		
Erysipelas.....																																	
Cancer	1																1	1		1													
Cerebro - Spinal Fevers.....																																	
Remittent and Intermittent Fevers.....																																	
Typhoid Fever																				1													
Typho - Malarial Fever.....																																	
Whooping-Cough.....																																	
Smallpox																																	
Measles.....																																	
Scarlet Fever	1																														1		
Croup.....									2																								
Diphtheria.....	2			1	1													2													1		
Other Diseases of St'mach & Bow'ls.....									1									1	1												1		
Cholera Infantum.....				1																					1								
Diarrhoea and Dysentery.....																	1																
Congestion of the Lungs.....																	1																
Acute Bronchitis.....		2																1	1														
Acute Pneumonia.....		1	1				1			5					2	1	1		1					1	1						3		
Consumption.....		2		11					3											1													
Total Deaths	0	18	2	14	3	2	2	1	3	11	0	0	0	0	2	2	2	11	3	0	7	2	0	8	0	0	7	1	0	2	10		
Estimated Population	550	12,300	600	5,000	1,000	800	450	1,601	2,000	4,000	2,591	300	500	800	2,000	500	1,250	1,500	8,390	2,500	1,000	2,500	400	1,650	200	7,000	800	1,500	12,000	800	1,980	700	7,000
	Alturas	Alameda	Alvarado and vicinity	Anaheim and vicinity	Antioch and vicinity	Anderson	Arbuckle and vicinity	Auburn	Azusa and vicinity	Bakersfield and vicinity	Benicia and vicinity	Bishop and vicinity	Calico	Carpenteria	Colton and vicinity	College City	Cottonwood and vicinity	Cloverdale	Chico and vicinity	Dixon and vicinity	Downeyville and vicinity	Downey and vicinity	Etna Mills	El Monte and vicinity	Elk Grove	Eureka and vicinity	Elsinore	Fort Bidwell and vicinity	Fresno	Fresno Flats	Folsom	Galt	Grass Valley and vicinity

JANUARY, 1893.

Reports from 112 cities, towns, villages, and sanitary districts, having an aggregate population of 841,285, show a total of 1,218 deaths from all causes. This corresponds to 1.44 per 1,000 for January, or 17.28 per 1,000 per annum.

There were 211 due to consumption, 107 to pneumonia, 86 to bronchitis, 10 to congestion of the lungs, 3 to diarrhoea and dysentery, 2 to cholera infantum, 64 to other diseases of the stomach and bowels, 24 to diphtheria, 13 to croup, 18 to scarlatina, 1 to smallpox, 2 to whooping-cough, 19 to typhoid fever, 3 to malarial fevers, 7 to cerebro-spinal fever, 42 to cancer, 1 to erysipelas, 110 to diseases of the heart, 4 to alcoholism, and 501 to all other causes, 1 being from la grippe. The mortality for January is lower than the corresponding month of the last two years. In January, 1891, it was 1.64; in January, 1892, 1.95; while in January, 1893, it was 1.44. In 1891, there were, during January, 397 deaths from diseases of the respiratory organs, 595 in 1892, and 414 during last January.

PREVAILING DISEASES.

Reports from 87 towns, villages, and sanitary districts outside of the large cities, give 154 cases of pneumonia, 286 of bronchitis, 57 of pleuritis, 31 of congestion of the lungs, 109 of diarrhoea, 35 of dysentery, 9 of cholera morbus, 17 of diphtheria, 22 of croup, 65 of scarlatina, 44 of measles, 37 of whooping-cough, 521 of la grippe, 24 of typhoid fever, 201 of malarial fevers, 8 of cerebro-spinal fever, 27 of erysipelas, 154 of rheumatism, 124 of neuralgia, 164 of tonsilitis, 56 of pharyngitis, and 9 of inflammation of the kidneys. Measles was reported epidemic at Folsom, and whooping-cough at Merced and Ventura.

SMALLPOX.

Since the December report was issued a number of communications have been received from health officials regarding the prevalence of this disease in and about San Luis Obispo, but no report was received from that town at all. There was a Board of Health, but it never made a report of mortality or prevailing diseases. Since the breaking out of smallpox, the Board of Health has been changed throughout, and the new Board, it is hoped, will comply with the law in making monthly reports. There was a manifest attempt to suppress the truth, inasmuch as no information could be obtained by correspondence. In view of the alarm felt in all the neighboring towns and throughout the country, it was found necessary to dispatch a Special Inspector, in order to ascertain the exact condition of affairs at that and other points, in order to see that all necessary precautions were being taken to prevent the spread of the disease, if it existed, as currently reported. The following is the report of the Inspector, Dr. L. A. Elster:

"SACRAMENTO, February 10, 1893.

"J. R. LAINE, M.D., *Secretary State Board of Health, Sacramento, Cal.*:

"SIR: Pursuant to your instructions, I have carefully investigated the outbreak of smallpox at San Luis Obispo and vicinity, and report as follows:

"The first case was that of Frank Jefferson, who came through by train over the Oregon route from the State of Washington, where he had been employed as a laborer on the Great Northern Railway. His case was recognized in the stage of eruption by Dr. Nichols, of San Luis Obispo, Chief Surgeon of the railroad contractors' camp near Santa Margarita. He was removed to a sufficient distance from the camp, and with his nurse, carefully isolated. It was in the confluent form, but he made a prompt recovery.

"Case No. 2 was a man who occupied the same tent, and had varioloid, from which he made a good recovery.

"Case No. 3 was a man who had slept with No. 2, and left the employ of the contractors before the development of the disease. In the interval he went to San Luis Obispo, and was in the town several days, until he became sick and applied for care at the camp. Dr. Nichols applied to the County Supervisors for the establishment of a pest ward near the camp, but this was refused on the ground that the contractors should take care of their own men. The contractors disclaimed responsibility for this patient, as he had left their employ, and the keeper of the Southern Pacific Hotel at Santa Margarita (where the patient had taken lodgings) had him conveyed to the County Hospital and left upon the grounds at night. The Steward of the hospital placed him in the pest ward, as the only alternative other than allowing him to die without shelter or care, but unfortunately the ward was occupied by two chronic patients, who contracted the disease, from which, however, they recovered, but No. 3 died.

"Case No. 6 was employed as a nurse to cases 3, 4, and 5, but not being protected, he contracted the disease, which, however, was not developed until he had returned to his home in the town. On the appearance of the disease his house was placed under a guard, and the yellow flag displayed. The patient died, but no other cases are known to have occurred from that source.

"Eight other cases occurred in the town, in which the source of infection was not clearly traced, but may be presumed to have arisen from some one of those detailed. Three other cases also occurred at the County Hospital, which, with those last mentioned, are all convalescent. It appears that of the cases which occurred within the town, no one has been so neglected as to prove a source of infection to others outside the houses in which they were. But a state of panic arose, in which the Town Trustees 'voted out' the members of the Board of Health, and elected a new Board, who issued a

circular addressed to all residents of the town, urging them to cleanliness and thorough disinfection of all premises, the retention of children within their homes, the avoidance of public gatherings, and the prompt report of all suspicious cases. They provided for public vaccinations and urged its general employment. They also caused to be printed and distributed, under the head of 'Health Rules,' instructions concerning isolation of patients and nurses, disinfection of clothing, bedding, and houses, and destruction of such bedding and clothing as, in the judgment of the Health Officer, could not be completely disinfected.

"At the time of my visit the Health Officer, Mr. W. J. Oaks, was devoting his whole attention to the work of stamping out the disease, and from personal observation I am convinced that there was no lack of effort to prevent its further extension. The schools were closed and public gatherings forbidden, and I thought it proper to say, through the local press, that there was then no more danger to persons visiting the town on business than if no smallpox cases had ever existed there. This public statement seemed to me desirable in justice to the business of the town, because many persons in the town and vicinity were suffering from alarm, which, however well founded at the outset, was now both needless and harmful. Concerning the present condition of the railway camp, I found Dr. Warren Brown, assistant to Dr. Nichols, in charge, and in company with him visited the site of the tents where the first cases occurred, and the site to which they were removed. Each showed the remains of fires in which all combustibles had been burned, including, at the latter site, the tents which had been occupied by patients, as well as that occupied by the nurse. There were no cases of the disease in the camp except that Mr. Stone, a brother of the contractor, was, at the time of my visit, showing symptoms which had led to exclusion of all persons liable to the infection, and I was requested to see him. I regarded him as a probable case (though as yet the eruption had not appeared in the fauces nor elsewhere), and recommended that arrangements be made to have him admitted to the pest ward of the County Hospital as a pay patient. On my return to San Luis Obispo, I reported the case to the proper authorities, and received their assurance of coöperation with those of the railway camp for the interest of the public health. The hospital ward being so isolated and now so guarded as to preclude all danger to the town, it was evidently better to remove all new cases there than to establish another center where the facilities for care of patients could not equal that of the County Hospital.

"Five cases are reported in San Luis Obispo since my visit there, but all among persons then known to have been exposed and therefore not indicative of danger to those in other houses. The case of Mr. Charles W. Merritt, of Santa Maria, who was treated in San Francisco, should be noticed in connection with these cases, because the history shows it probable that he was infected from the same source which caused that of Frank Jefferson (Case No. 1). Mr. Merritt came down on the train, and was in the smoking car where were some laborers bound for the railroad camp near Santa Margarita. Subsequently he went to San Francisco, and while there developed the disease, being the first case in that city during the present season, and possibly the source of the six cases which have since occurred there. The record of the cases since December 1st, in San Francisco, is as follows: Case No. 1, Charles W. Merritt, of Santa Maria, Cal., at 331 Turk Street, reported December 3, 1892, released January 4, 1893. Case No. 2, Miss Margaret Healy, from 111½ Minna Street, to pest-house, December 19th; result, recovered. Case No. 3, Captain John Smith, 305 Turk Street (same block with Case 1), reported December 24th, released January 24th. Cases Nos. 4, 5, and 6, Willie, Alrich, and George Ramensperger, 2394 Howard Street, reported January 14th; one died January 22d, two released February 3d. Case No. 7, John Schobius, removed January 21st, from Ward K, City Hospital, to pest-house.

"The report of cases of smallpox at Santa Cruz proved false. No cases have occurred there this season.

"The first case in the vicinity of Sacramento was an employé who left the railroad camp near Santa Margarita early in December, and after three weeks arrived at the house of his brother-in-law, Mr. Shoup, who, with four of his children, contracted the disease from him. They were reported to the Health Officer of the city, Dr. H. L. Nichols, who took all care and prevented the extension of the disease in adjacent houses. Another child of Mr. Shoup, an infant, had escaped the first infection, but two weeks later developed the disease, while the mother, who had been vaccinated, has so far escaped it, and the house has been carefully disinfected under direction of Dr. Nichols, so that no further danger is apprehended at that point. The second case was that of Mr. Swingle, of Swingle Station, January 1, 1893. Having been vaccinated, he had a case of varioloid, from which he made a prompt recovery. The most thorough care was used to prevent infection, and no others suffered from that source. Concerning the source of infection in this case, I learn from the father of the patient that his son had passed through the railway depot near his ranch about nine days previous to his attack, and there saw a man who seemed to be sick, and had an eruption, which a comrade, who had had the disease, declared to be smallpox. It is surmised that this unknown patient was the same who is described as the first case, and that he was then on his way to Sacramento, where he arrived four or five days later. The first case treated in the Sacramento pest-house, John Cuff, came from a railway camp near Delta. He was admitted to the Railroad Hospital January 20th, and two days later was found to be a case of smallpox, and removed to the pest-house, where he died January 30th. Two cases resulted from his stay in the Railroad Hospital—a nurse and a patient who lay in the cot next to Cuff. Both were cases of varioloid, and are reported convalescent.

"Total number of cases reported, 41; deaths, 7; discharged, 31; convalescent, 3.

"It is to be regretted that due attention has not been given in some localities to the law requiring reports to the State Board of Health of 'all cases of contagious diseases,' and to be hoped that in all portions of the State, local Boards will comply with this provision, as by prompt action the spread of such diseases may be limited, and the life and health of many preserved. It is reasonably sure that twenty-two cases in San Luis Obispo and the railway camp near Santa Margarita, the case of Mr. Merritt, and possibly others at San Francisco, and eight of the cases near Sacramento, were all infected from a single source.

"The loss of life, the physical suffering, and the injury to business interests represented by these thirty cases, largely outweigh the slight expenditure which, at the proper time and place, might have prevented the entrance of the first source of infection from the north. I wish to acknowledge here the uniform courtesy extended to me as your representative, by the local Boards of Health of San Luis Obispo, San Francisco, and Sacramento, and the physician and superintendent of the railway camp near Santa Margarita.

"Very respectfully,

"L. A. ELSTER, M.D.,
"Special Inspector."

ABSTRACT FOR JANUARY, 1898—Continued.

Other Causes	3	4	1	1	2	2	1	37	1	3	2	6	1	2	29	1	2	2	2	1	1												
Alcoholism			1																	1													
Heart Diseases							1	6	1						14		1				1												
Erysipelas																																	
Cancer								8		1	1		2			1	2		1	1													
Cerebro - Spinal Fevers			1									1																					
Remittent and Intermittent Fevers																																	
Typhoid Fever		1						1	1		1							1			1												
Typho - Malarial Fever																																	
Whooping-Cough																																	
Smallpox																																	
Measles																																	
Scarlet Fever			1					1																									
Croup									1	1																							
Diphtheria			2					1	1																								
Other Diseases of St'mach & Bow'ls			1					1	4						4			2	1		1												
Cholera Infantum																																	
Diarrhoea and Dysentery		1						1																									
Congestion of the Lungs															1																		
Acute Bronchitis								5							2	1					2												
Acute Pneumonia		2	1	1	1			3	1	1					18	1			1	2	1												
Consumption															15	1	1	1	10	4	1												
Total Deaths	0	6	0	9	4	2	1	3	88	6	0	13	1	3	89	15	3	2	17	4	5												
Estimated Population	1,980	700	7,000	700	3,500	2,000	1,250	500	2,000	1,200	1,200	80,000	2,009	300	1,000	1,000	1,000	10,000	8,000	3,000	1,000												
	Folsom	Galt	Grass Valley and vicinity	Gridley	Haywards	Hollister	Knights Ferry and vicinity	Lockeford	Long Beach and vicinity	Lincoln	Lakeport	Lodi and vicinity	Los Angeles	Merced	Millville	Mariposa	Middletown	Monrovia	Monterey	Napa	National City	Nevada City	Nicolaus	Oakland	Oceanside	Oroville	Ontario and vicinity	Paso Robles	Pasadena and vicinity	Petaluma and vicinity	Placerville, S. D., No. 2	Pomona and vicinity	Pleasanton and vicinity

ABSTRACT FOR JANUARY, 1893—CONTINUED.

Other Causes	—	1	501
Alcoholism	—	—	4
Heart Diseases	—	—	110
Erysipelas	—	—	1
Cancer	—	—	42
Cerebro - Spinal Fevers	—	—	7
Remittent and Intermittent Fevers	—	—	3
Typhoid Fever	—	—	19
Typho - Malarial Fever	—	—	—
Whooping-Cough	—	—	2
Smallpox	—	—	1
Measles	—	—	0
Scarlet Fever	—	—	18
Croup	—	—	13
Diphtheria	—	—	24
Other Diseases of St'mach & Bow'ls	—	—	54
Cholera Infantum	—	—	2
Diarrhoea and Dysentery	—	—	3
Congestion of the Lungs	—	—	10
Acute Bronchitis	—	—	86
Acute Pneumonia	—	1	107
Consumption	1	—	211
Total Deaths	1	2	1,218
Estimated Population	800	3,500	841,285
Woodbridge	—	—	—
Woodland	—	—	—
Totals	—	—	—

FEBRUARY, 1898.

Reports from 98 cities, towns, villages, and sanitary districts, aggregating a population of 801,581, show a total of 1,019 deaths from all causes in February. This corresponds to a death-rate of 1.27 per 1,000 for the month, or 15.24 per 1,000 per annum.

There were 187 due to consumption, 121 to pneumonia, 34 to bronchitis, 6 to congestion of the lungs, 6 to diarrhoea and dysentery, 51 to other diseases of the stomach and bowels, 21 to diphtheria, 8 to croup, 14 to scarlatina, 3 to smallpox, 3 to whooping-cough, 18 to typhoid fever, 8 to cerebro-spinal fever, 1 to malarial fever, 29 to cancer, 1 to erysipelas, 89 to diseases of the heart, 3 to alcoholism, and 416 to all other causes, among which 7 were due to la grippe.

PREVAILING DISEASES.

Reports from 73 towns, villages, and sanitary districts outside of the large cities, give 122 cases of pneumonia, 267 of bronchitis, 32 of pleurisy, 30 of congestion of the lungs, 66 of diarrhoea, 20 of dysentery, one of cholera morbus, 9 of cholera infantum, 9 of diphtheria, 19 of croup, 32 of scarlatina, 48 of measles, 69 of whooping-cough, 615 of la grippe, 16 of typhoid fever, 133 of malarial fever, 4 of cerebro-spinal fever, 19 of erysipelas, 125 of rheumatism, 121 of neuralgia, and 147 of tonsillitis.

SMALLPOX.

Two deaths from this malady were reported from San Luis Obispo as having occurred in February, but late authentic reports show no new cases. All quarantine is raised, and no further danger is apprehended.

The report of smallpox in Woodland was obtained, not from the Health Officer, but from a member of the Board of Health. The first case that appeared came from the smallpox camp at Santa Margarita, to visit his sister at or near Sacramento, where he infected the entire family of seven persons, which were reported in February. From Sacramento he went to Woodland, and it is not unlikely that he infected a young man at Swingle Station on his way to the Yolo County Hospital, where he was received as a patient, and infected other inmates of the hospital before the true nature of his case was recognized. As usual, there was the manifest attempt to suppress facts, and with the common result of such a pernicious policy—which is the inevitable spread of the disease—came distrust, alarm, and avoidance of the town. No reliable information could be obtained, except through the Special Inspector of the State Board of Health, who ascertained that there had been at least ten cases, with two deaths, none of which have been reported directly from or through the health officers of Woodland. It would be as well to abandon forever this injurious notion that the presence of smallpox in a locality is a matter to be concealed. There is no more certain means of causing its spread. The authorities should be at once fully informed, and all precautions speedily taken to limit its spread, after which it should be authoritatively announced that all danger is passed. The history of the epidemic at Woodland proves this to be true, for not until full publicity was given of the true state of the facts were full and ample steps taken to prevent its spread. It is to be hoped that chickenpox will no longer be the name under which modified smallpox is to masquerade. If medical men are to give out that adults enter hospitals on account of chickenpox, it is time to inform the people that any such statement is altogether improbable. Chickenpox is a disease of childhood, and when a grown man is said by a physician to have this malady, it is safe to set it down as a case of modified smallpox, which we call varioloid. Publicity is the only sure means of limiting the spread of the disease, for not until it is recognized will sufficient effort be made to stamp it out.

There was one new case at San Francisco in February.

A case died at Paperville, having contracted the disease at San Francisco.

Another case was discovered at Lone, but in this case, as in the case at Paperville, there was no further spread of the disease.

[illegible]

MARCH, 1893.

Reports from 102 cities, towns, villages, and sanitary districts, aggregating a population of 810,613, show a total mortality of 1,090 from all causes in March. This corresponds to a death-rate of 1.31 per 1,000 per month, or 15.72 per annum.

There were 189 deaths due to consumption, 97 to pneumonia, 45 to bronchitis, 4 to congestion of the lungs, 7 to diarrhoea and dysentery, 1 to cholera infantum, 46 to other diseases of the stomach and bowels, 13 to diphtheria, 5 to croup, 12 to scarlatina, 1 to smallpox, 3 to whooping-cough, 13 to typhoid fever, 3 to malarial fevers, 7 to cerebro-spinal fever, 44 to cancer, 3 to erysipelas, 51 to diseases of the heart, 1 to alcoholism, and 505 to all other causes, among which were 4 cases of la grippe. The death from smallpox was the case reported in February in San Francisco.

PREVAILING DISEASES.

Reports of prevailing diseases from 83 towns and villages outside of the larger cities give 105 cases of pneumonia, 257 of bronchitis, 65 of pleuritis, 33 of congestion of the lungs, 84 of diarrhoea, 9 of dysentery, 5 of cholera morbus, 8 of cholera infantum, 5 of diphtheria, 38 of croup, 34 of scarlatina, 48 of measles, 4 of smallpox, 51 of whooping-cough, 335 of la grippe, 21 of typhoid fever, 181 of malarial fevers, 3 of cerebro-spinal fever, 29 of erysipelas, 160 of rheumatism, 156 of neuralgia, 157 of tonsillitis, 53 of pharyngitis, and 3 of trichinosis.

Measles was reported epidemic at Folsom, and whooping-cough at Folsom, Merced, and Fresno. Four cases of smallpox were reported from Oakland. The usual precautions have been taken, and it is believed that the disease will be stamped out.

SANITARY CONVENTION.

A Sanitary Convention will be held at B'nai B'rith Hall, in San Francisco, on Monday, April 17th, at 1:30 P. M., and continue during the afternoon and evening. This convention is held in order to bring together as many as practicable of those who are interested in public health and general sanitary matters, to discuss questions that touch upon the probabilities of an invasion of our country during the coming months by cholera, and to devise and decide upon a mode of action in concert, and upon a plane as far advanced as the investigations of the scientific world will warrant. The indications are that the meeting will be well attended. Some excellent papers are promised, which, with a synopsis of the discussions which are expected to follow, are to be published for distribution. A general invitation is extended to those interested in sanitary work, whether members of the medical profession or in other walks of life.

APRIL, 1898.

Reports from 114 cities, towns, villages, and sanitary districts, aggregating a population of 858,413, show a total mortality of 963 from all causes in the month of April. This corresponds to a death-rate of 1.11 per 1,000 per month, or 13.32 per annum.

There were 193 deaths due to consumption, 70 to pneumonia, 22 to bronchitis, 8 to congestion of the lungs, 1 to dysentery, 3 to cholera infantum, 52 to other diseases of the stomach and bowels, 16 to diphtheria, 6 to croup, 10 to scarlatina, 8 to whooping-cough, 13 to typhoid fever, 5 to malarial fever, 6 to cerebro-spinal fever, 26 to cancer, 5 to erysipelas, 77 to diseases of the heart, 5 to alcoholism, and 432 to all other causes.

PREVAILING DISEASES.

Reports of prevailing diseases from 63 towns and villages outside of the larger cities, give 52 cases of pneumonia, 156 of bronchitis, 33 of pleuritis, 16 of congestion of the lungs, 77 of diarrhoea, 11 of dysentery, 13 of cholera morbus, 7 of cholera infantum, 19 of diphtheria, 19 of croup, 33 of scarlatina, 91 of measles, 86 of whooping-cough, 205 of la grippe, 9 of typhoid fever, 199 of malarial fever, 3 of cerebro-spinal fever, 24 of erysipelas, 106 of rheumatism, 139 of neuralgia, 124 of tonsillitis, and 65 of pharyngitis.

Scarlatina was reported epidemic at Knight's Ferry, measles at Merced and Elk Grove, whooping-cough at Hollister, and tonsillitis at Williams. Epidemic of measles and whooping-cough at Folsom is reported declining.

REPORT OF THE STATE BOARD OF HEALTH.

Other Causes	1	7	1	2	7	4				1	2	1	1	4	2	1	1	8	4	1	3
Alcoholism.....																					
Heart Diseases		1				1						1	1	2		1					
Erysipelas.....			1																		
Cancer			1			1													1		
Cerebro - Spinal Fevers.....														2							
Remittent and Intermittent Fevers.....						1															
Typhoid Fever						1															
Typho - Malarial Fever.....																					
Whooping-Cough..		1																			
Smallpox																					
Measles.....																					
Scarlet Fever																					
Croup																					
Diphtheria				1									1								
Other Diseases of St'mach & Bow'ls.....						1				1											
Cholera Infantum.....																					
Diarrhoea and Dysentery.....																					
Congestion of the Lungs.....						1															
Acute Bronchitis..														2					1		
Acute Pneumonia..			1		1											1					
Consumption		1	4		1	2	1			1	2			1					2	1	
Total Deaths	1	14	0	2	3	1	2	3	10	2	7	0	0	0	1	1	11	0	0	10	3
Estimated Population	1,500	12,500	5,000	1,000	3,000	500	1,801	2,500	4,000	3,500	4,000	1,000	1,500	500	600	800	2,000	700	1,250	1,500	8,880
Alturas	1,500	12,500	5,000	1,000	3,000	500	1,801	2,500	4,000	3,500	4,000	1,000	1,500	500	600	800	2,000	700	1,250	1,500	8,880
Alameda	1,500	12,500	5,000	1,000	3,000	500	1,801	2,500	4,000	3,500	4,000	1,000	1,500	500	600	800	2,000	700	1,250	1,500	8,880
Anaheim and vicinity	1,500	12,500	5,000	1,000	3,000	500	1,801	2,500	4,000	3,500	4,000	1,000	1,500	500	600	800	2,000	700	1,250	1,500	8,880
Anderson	1,500	12,500	5,000	1,000	3,000	500	1,801	2,500	4,000	3,500	4,000	1,000	1,500	500	600	800	2,000	700	1,250	1,500	8,880
Antioch and vicinity	1,500	12,500	5,000	1,000	3,000	500	1,801	2,500	4,000	3,500	4,000	1,000	1,500	500	600	800	2,000	700	1,250	1,500	8,880
Arbuckle	1,500	12,500	5,000	1,000	3,000	500	1,801	2,500	4,000	3,500	4,000	1,000	1,500	500	600	800	2,000	700	1,250	1,500	8,880
Auburn	1,500	12,500	5,000	1,000	3,000	500	1,801	2,500	4,000	3,500	4,000	1,000	1,500	500	600	800	2,000	700	1,250	1,500	8,880
Azusa and vicinity	1,500	12,500	5,000	1,000	3,000	500	1,801	2,500	4,000	3,500	4,000	1,000	1,500	500	600	800	2,000	700	1,250	1,500	8,880
Bakersfield and vicinity	1,500	12,500	5,000	1,000	3,000	500	1,801	2,500	4,000	3,500	4,000	1,000	1,500	500	600	800	2,000	700	1,250	1,500	8,880
Benicia and vicinity	1,500	12,500	5,000	1,000	3,000	500	1,801	2,500	4,000	3,500	4,000	1,000	1,500	500	600	800	2,000	700	1,250	1,500	8,880
Berkeley	1,500	12,500	5,000	1,000	3,000	500	1,801	2,500	4,000	3,500	4,000	1,000	1,500	500	600	800	2,000	700	1,250	1,500	8,880
Biggs	1,500	12,500	5,000	1,000	3,000	500	1,801	2,500	4,000	3,500	4,000	1,000	1,500	500	600	800	2,000	700	1,250	1,500	8,880
Bishop and vicinity	1,500	12,500	5,000	1,000	3,000	500	1,801	2,500	4,000	3,500	4,000	1,000	1,500	500	600	800	2,000	700	1,250	1,500	8,880
Calico	1,500	12,500	5,000	1,000	3,000	500	1,801	2,500	4,000	3,500	4,000	1,000	1,500	500	600	800	2,000	700	1,250	1,500	8,880
Calistoga	1,500	12,500	5,000	1,000	3,000	500	1,801	2,500	4,000	3,500	4,000	1,000	1,500	500	600	800	2,000	700	1,250	1,500	8,880
Carpenteria	1,500	12,500	5,000	1,000	3,000	500	1,801	2,500	4,000	3,500	4,000	1,000	1,500	500	600	800	2,000	700	1,250	1,500	8,880
Concord	1,500	12,500	5,000	1,000	3,000	500	1,801	2,500	4,000	3,500	4,000	1,000	1,500	500	600	800	2,000	700	1,250	1,500	8,880
Colton	1,500	12,500	5,000	1,000	3,000	500	1,801	2,500	4,000	3,500	4,000	1,000	1,500	500	600	800	2,000	700	1,250	1,500	8,880
College City	1,500	12,500	5,000	1,000	3,000	500	1,801	2,500	4,000	3,500	4,000	1,000	1,500	500	600	800	2,000	700	1,250	1,500	8,880
Cottonwood and vicinity	1,500	12,500	5,000	1,000	3,000	500	1,801	2,500	4,000	3,500	4,000	1,000	1,500	500	600	800	2,000	700	1,250	1,500	8,880
Cloverdale	1,500	12,500	5,000	1,000	3,000	500	1,801	2,500	4,000	3,500	4,000	1,000	1,500	500	600	800	2,000	700	1,250	1,500	8,880
Chico and vicinity	1,500	12,500	5,000	1,000	3,000	500	1,801	2,500	4,000	3,500	4,000	1,000	1,500	500	600	800	2,000	700	1,250	1,500	8,880
Dixon and vicinity	1,500	12,500	5,000	1,000	3,000	500	1,801	2,500	4,000	3,500	4,000	1,000	1,500	500	600	800	2,000	700	1,250	1,500	8,880
Downey and vicinity	1,500	12,500	5,000	1,000	3,000	500	1,801	2,500	4,000	3,500	4,000	1,000	1,500	500	600	800	2,000	700	1,250	1,500	8,880
Etna Mills and vicinity	1,500	12,500	5,000	1,000	3,000	500	1,801	2,500	4,000	3,500	4,000	1,000	1,500	500	600	800	2,000	700	1,250	1,500	8,880
Elk Grove	1,500	12,500	5,000	1,000	3,000	500	1,801	2,500	4,000	3,500	4,000	1,000	1,500	500	600	800	2,000	700	1,250	1,500	8,880
Eureka and vicinity	1,500	12,500	5,000	1,000	3,000	500	1,801	2,500	4,000	3,500	4,000	1,000	1,500	500	600	800	2,000	700	1,250	1,500	8,880
El Monte and vicinity	1,500	12,500	5,000	1,000	3,000	500	1,801	2,500	4,000	3,500	4,000	1,000	1,500	500	600	800	2,000	700	1,250	1,500	8,880
Fresno Flats	1,500	12,500	5,000	1,000	3,000	500	1,801	2,500	4,000	3,500	4,000	1,000	1,500	500	600	800	2,000	700	1,250	1,500	8,880
Fresno	1,500	12,500	5,000	1,000	3,000	500	1,801	2,500	4,000	3,500	4,000	1,000	1,500	500	600	800	2,000	700	1,250	1,500	8,880
Folsom	1,500	12,500	5,000	1,000	3,000	500	1,801	2,500	4,000	3,500	4,000	1,000	1,500	500	600	800	2,000	700	1,250	1,500	8,880
Gait	1,500	12,500	5,000	1,000	3,000	500	1,801	2,500	4,000	3,500	4,000	1,000	1,500	500	600	800	2,000	700	1,250	1,500	8,880
Grass Valley and vicinity	1,500	12,500	5,000	1,000	3,000	500	1,801	2,500	4,000	3,500	4,000	1,000	1,500	500	600	800	2,000	700	1,250	1,500	8,880

ABSTRACT FOR APRIL, 1893—Continued.

Other Causes	1	4	7	1	2	3	1	1	1	1	432
Alcoholism	1	1	1	1	1	1	1	1	1	1	5
Heart Diseases	1	3	1	1	1	1	1	1	1	1	77
Erysipelas	1	1	1	1	1	1	1	1	1	1	5
Cancer	1	1	1	1	1	1	1	1	1	1	26
Cerebro - Spinal Fevers	1	1	1	1	1	1	1	1	1	1	6
Remittent and Intermittent Fevers	1	1	1	1	1	1	1	1	1	1	5
Typhoid Fever	1	1	1	1	1	1	1	1	1	1	13
Typho - Malarial Fever	1	1	1	1	1	1	1	1	1	1	...
Whooping-Cough	1	1	1	1	1	1	1	1	1	1	8
Smallpox	1	1	1	1	1	1	1	1	1	1	0
Measles	1	1	1	1	1	1	1	1	1	1	0
Scarlet Fever	1	1	1	1	1	1	1	1	1	1	10
Croup	1	1	1	1	1	1	1	1	1	1	6
Diphtheria	1	1	1	1	1	1	1	1	1	1	16
Other Diseases of St'mach & Bow'ls	1	1	1	1	1	1	1	1	1	1	52
Cholera Infantum	1	1	1	1	1	1	1	1	1	1	3
Diarrhoea and Dysentery	1	1	1	1	1	1	1	1	1	1	1
Congestion of the Lungs	1	1	1	1	1	1	1	1	1	1	3
Acute Bronchitis	1	1	1	1	1	1	1	1	1	1	22
Acute Pneumonia	1	2	1	1	1	1	1	1	1	1	70
Consumption	1	4	3	1	1	1	1	1	1	1	193
Total Deaths	4	15	11	0	2	5	0	2	1	3	953
Estimated Population	3,000	1,000	14,378	2,800	850	1,300	4,000	300	6,000	4,500	3,000
Selma and vicinity	1,000	1,000	14,378	2,800	850	1,300	4,000	300	6,000	4,500	3,000
Siscon	1,000	1,000	14,378	2,800	850	1,300	4,000	300	6,000	4,500	3,000
Stockton	1,000	1,000	14,378	2,800	850	1,300	4,000	300	6,000	4,500	3,000
St. Helena and vicinity	1,000	1,000	14,378	2,800	850	1,300	4,000	300	6,000	4,500	3,000
Susanville	1,000	1,000	14,378	2,800	850	1,300	4,000	300	6,000	4,500	3,000
Truckee and vicinity	1,000	1,000	14,378	2,800	850	1,300	4,000	300	6,000	4,500	3,000
Tulare City	1,000	1,000	14,378	2,800	850	1,300	4,000	300	6,000	4,500	3,000
Upper Lake	1,000	1,000	14,378	2,800	850	1,300	4,000	300	6,000	4,500	3,000
Vallejo and vicinity	1,000	1,000	14,378	2,800	850	1,300	4,000	300	6,000	4,500	3,000
Vacaville and Elmira	1,000	1,000	14,378	2,800	850	1,300	4,000	300	6,000	4,500	3,000
Watsonville and vicinity	1,000	1,000	14,378	2,800	850	1,300	4,000	300	6,000	4,500	3,000
Wheatland	1,000	1,000	14,378	2,800	850	1,300	4,000	300	6,000	4,500	3,000
Winters and vicinity	1,000	1,000	14,378	2,800	850	1,300	4,000	300	6,000	4,500	3,000
Williams	1,000	1,000	14,378	2,800	850	1,300	4,000	300	6,000	4,500	3,000
Woodbridge	1,000	1,000	14,378	2,800	850	1,300	4,000	300	6,000	4,500	3,000
Woodland	1,000	1,000	14,378	2,800	850	1,300	4,000	300	6,000	4,500	3,000
Totals	853,413	853,413	853,413	853,413	853,413	853,413	853,413	853,413	853,413	853,413	853,413

MAY, 1893.

Reports from 104 cities, towns, villages, and sanitary districts, aggregating a population of 833,384, show a total mortality of 1,016 from all causes in May. This corresponds to a death-rate of 1.21 per 1,000 per month, or 14.52 per annum.

There were 157 deaths due to consumption, 68 to pneumonia, 34 to bronchitis, 8 to congestion of the lungs, 10 to diarrhoea, 6 to dysentery, 9 to cholera infantum, 53 to other diseases of the stomach and bowels, 22 to diphtheria, 11 to croup, 6 to scarlatina, 1 to measles, 1 to smallpox, 3 to whooping-cough, 18 to typhoid fever, 1 to malarial fever, 16 to cerebro-spinal fever, 39 to cancer, 5 to erysipelas, 91 to diseases of the heart, 4 to alcoholism, and 455 to all other causes. The death from smallpox was in San Francisco.

PREVAILING DISEASES.

Reports of prevailing diseases from 60 towns and villages outside of the larger cities, having an aggregate population of 493,624, give 45 cases of pneumonia, 145 of bronchitis, 20 of pleuritis, 18 of congestion of the lungs, 150 of diarrhoea, 24 of dysentery, 29 of cholera morbus, 19 of cholera infantum, 9 of diphtheria, 15 of croup, 27 of scarlatina, 107 of measles, 1 of smallpox, 85 of whooping-cough, 142 of la grippe, 17 of typhoid fever, 214 of malarial fevers, 3 of cerebro-spinal fever, 24 of erysipelas, 140 of rheumatism, 108 of neuralgia, 110 of tonsillitis, and 70 of pharyngitis.

Measles was reported epidemic at Red Bluff, and whooping-cough at Hollister and Folsom. The case of smallpox reported under this head was in Fresno; the patient was isolated, made good recovery, and no further trouble is apprehended from that source.

Abstract of the Reports of Deaths and their Causes in the following Cities and Towns of California during May, 1893.

	Other Causes	1	8	1	5	2	4	2	1	2	1	1	1	4	1	1	1	4	4	1	1
	Alcoholism	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Heart Diseases	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1
	Erysipelas	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Cancer	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Cerebro - Spinal Fevers	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Remittent and Intermittent Fevers	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Typhoid Fever	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Typho - Malarial Fever	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Whooping-Cough	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Smallpox	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Measles	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Scarlet Fever	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Croup	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Diphtheria	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Other Diseases of St'mach & Bow'ls	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Cholera Infantum	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Diarrhœa and Dysentery	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Congestion of the Lungs	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Acute Bronchitis	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Acute Pneumonia	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Consumption	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Total Deaths	1	16	1	1	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Estimated Population	1,500	13,500	6,000	800	3,000	1,601	2,500	4,800	3,500	1,000	1,500	600	800	2,000	700	500	1,250	1,500	8,890	1,000
		Alturas	Alameda	Anaheim and vicinity	Anderson	Antioch and vicinity	Auburn	Azusa and vicinity	Bakersfield	Benicia	Biggs	Bishop and vicinity	Calico and vicinity	Calistoga	Carpenteria	Colton and vicinity	College City	Concord	Cottonwood and vicinity	Cloverdale	Chico and vicinity
		Davisville	Dixon and vicinity	Downieville and vicinity	Downey and vicinity	Etna Mills and vicinity	El Monte and vicinity	Eureka	Elainore and vicinity	Fort Bidwell and vicinity	Fresno	Fresno Flats	Folsom	Galt							

[illegible]

JUNE, 1893.

Reports from 97 cities, towns, villages, and sanitary districts, aggregating a population of 826,794, show a mortality of 961 from all causes in June. This corresponds to a death-rate of 1.16 per 1,000 per month, or 13.92 per annum.

There were 146 deaths due to consumption, 67 to pneumonia, 23 to bronchitis, 2 to congestion of the lungs, 15 to diarrhoea and dysentery, 23 to cholera infantum, 64 to other diseases of the stomach and bowels, 10 to diphtheria, 4 to croup, 7 to scarlatina, 1 to measles, 4 to whooping-cough, 35 to typhoid fever, 4 to malarial fevers, 8 to cerebro-spinal fever, 29 to cancer, 1 to erysipelas, 71 to diseases of the heart, 8 to alcoholism, and 439 to all other causes.

PREVAILING DISEASES.

Reports of prevailing diseases from 63 towns and villages outside the larger cities, give 28 cases of pneumonia, 99 of bronchitis, 22 of pleuritis, 10 of congestion of the lungs, 268 of diarrhoea, 69 of dysentery, 58 of cholera morbus, 42 of cholera infantum, 35 of diphtheria, 6 of croup, 28 of scarlatina, 44 of measles, 79 of whooping-cough, 98 of la grippe, 93 of typhoid fever, 268 of malarial fevers, 1 of cerebro-spinal fever, 34 of erysipelas, 129 of rheumatism, 104 of neuralgia, 96 of tonsilitis, and 51 of pharyngitis.

Measles was reported epidemic at Biggs and Elk Grove, and whooping-cough at Merced. One observer reported 15 cases of enteritis.

[illegible]

ABSTRACT FOR JUNE, 1883—Continued.

Other Causes	5	2	1	2	1	2	1	3	1	8	1	1	1	2	1	1	439
Alcoholism	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	8
Heart Diseases	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	71
Erysipelas	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Cancer	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	29
Cerebro - Spinal Fevers	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	8
Remittent and Intermittent Fevers	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	4
Typhoid Fever	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	35
Typho - Malarial Fever	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Whooping-Cough	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	4
Smallpox	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
Measles	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Scarlet Fever	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	7
Croup	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	4
Diphtheria	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	10
Other Diseases of St'mach & Bow'ls	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	64
Cholera Infantum	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	23
Diarrhoea and Dysentery	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15
Congestion of the Lungs	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2
Acute Bronchitis	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	23
Acute Pneumonia	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	67
Consumption	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	146
Total Deaths	6	5	1	7	4	4	1	0	2	18	1	1	0	0	1	0	961
Estimated Population	5,864	5,000	1,000	5,216	1,200	3,000	1,000	1,000	280	17,000	2,800	2,000	850	350	5,000	3,000	823,734
Santa Barbara	5,864	5,000	1,000	5,216	1,200	3,000	1,000	1,000	280	17,000	2,800	2,000	850	350	5,000	3,000	823,734
Santa Monica and vicinity	5,864	5,000	1,000	5,216	1,200	3,000	1,000	1,000	280	17,000	2,800	2,000	850	350	5,000	3,000	823,734
Santa Maria	5,864	5,000	1,000	5,216	1,200	3,000	1,000	1,000	280	17,000	2,800	2,000	850	350	5,000	3,000	823,734
Santa Rosa	5,864	5,000	1,000	5,216	1,200	3,000	1,000	1,000	280	17,000	2,800	2,000	850	350	5,000	3,000	823,734
Sausalito	5,864	5,000	1,000	5,216	1,200	3,000	1,000	1,000	280	17,000	2,800	2,000	850	350	5,000	3,000	823,734
Selma and vicinity	5,864	5,000	1,000	5,216	1,200	3,000	1,000	1,000	280	17,000	2,800	2,000	850	350	5,000	3,000	823,734
Sisson	5,864	5,000	1,000	5,216	1,200	3,000	1,000	1,000	280	17,000	2,800	2,000	850	350	5,000	3,000	823,734
Soquel	5,864	5,000	1,000	5,216	1,200	3,000	1,000	1,000	280	17,000	2,800	2,000	850	350	5,000	3,000	823,734
Stockton	5,864	5,000	1,000	5,216	1,200	3,000	1,000	1,000	280	17,000	2,800	2,000	850	350	5,000	3,000	823,734
St. Helena and vicinity	5,864	5,000	1,000	5,216	1,200	3,000	1,000	1,000	280	17,000	2,800	2,000	850	350	5,000	3,000	823,734
Solano County, District No. 2	5,864	5,000	1,000	5,216	1,200	3,000	1,000	1,000	280	17,000	2,800	2,000	850	350	5,000	3,000	823,734
Susanville	5,864	5,000	1,000	5,216	1,200	3,000	1,000	1,000	280	17,000	2,800	2,000	850	350	5,000	3,000	823,734
Tehama	5,864	5,000	1,000	5,216	1,200	3,000	1,000	1,000	280	17,000	2,800	2,000	850	350	5,000	3,000	823,734
Trinity County	5,864	5,000	1,000	5,216	1,200	3,000	1,000	1,000	280	17,000	2,800	2,000	850	350	5,000	3,000	823,734
Tulare City	5,864	5,000	1,000	5,216	1,200	3,000	1,000	1,000	280	17,000	2,800	2,000	850	350	5,000	3,000	823,734
Vacaville and Elmira	5,864	5,000	1,000	5,216	1,200	3,000	1,000	1,000	280	17,000	2,800	2,000	850	350	5,000	3,000	823,734
Valejo	5,864	5,000	1,000	5,216	1,200	3,000	1,000	1,000	280	17,000	2,800	2,000	850	350	5,000	3,000	823,734
Watsonville	5,864	5,000	1,000	5,216	1,200	3,000	1,000	1,000	280	17,000	2,800	2,000	850	350	5,000	3,000	823,734
Wheatland	5,864	5,000	1,000	5,216	1,200	3,000	1,000	1,000	280	17,000	2,800	2,000	850	350	5,000	3,000	823,734
Woodland	5,864	5,000	1,000	5,216	1,200	3,000	1,000	1,000	280	17,000	2,800	2,000	850	350	5,000	3,000	823,734
Totals	5,864	5,000	1,000	5,216	1,200	3,000	1,000	1,000	280	17,000	2,800	2,000	850	350	5,000	3,000	823,734

JULY, 1893.

Reports from 96 cities, towns, villages, and sanitary districts, aggregating a population of 824,150, show a total mortality of 988 from all causes in the month of July. This corresponds to a death-rate of 1.198 per month, or 14.376 per annum.

There were 133 deaths due to consumption, 45 to pneumonia, 15 to bronchitis, 6 to congestion of the lungs, 21 to diarrhoea and dysentery, 36 to cholera infantum, 83 to other diseases of the stomach and bowels, 16 to diphtheria, 6 to croup, 1 to scarlatina, 2 to measles, 11 to whooping-cough, 58 to typhoid fever, 9 to malarial fevers, 5 to cerebro-spinal fever, 31 to cancer, 2 to erysipelas, 72 to diseases of the heart, 8 to alcoholism, and 423 to all other causes.

PREVAILING DISEASES.

Reports of prevailing diseases from 60 towns, villages, and sanitary districts outside of the larger cities, give 23 cases of pneumonia, 62 of bronchitis, 20 of pleuritis, 18 of congestion of the lungs, 272 of diarrhoea, 65 of dysentery, 89 of cholera morbus, 64 of cholera infantum, 4 of diphtheria, 14 of croup, 17 of scarlatina, 49 of measles, 63 of whooping-cough, 18 of la grippe, 56 of typhoid fever, 244 of malarial fevers, 8 of cerebro-spinal fever, 15 of erysipelas, 90 of rheumatism, 71 of neuralgia, 98 of tonsillitis, and 24 of pharyngitis.

Abstract of the Reports of Deaths and their Causes in the following Cities and Towns of California during July, 1893.

	Other Causes	Alcoholism	Heart Diseases	Erysipelas	Cancer	Cerebro - Spinal Fevers	Remittent and Intermittent Fevers	Typhoid Fever	Typho - Malarial Fever	Whooping-Cough	Smallpox	Measles	Scarlet Fever	Croup	Diphtheria	Other Diseases of St'mach & Bow'ls	Cholera Infantum	Diarrhœa and Dysentery	Congestion of the Lungs	Acute Bronchitis	Acute Pneumonia	Consumption	Total Deaths	Estimated Population	
Alturas	6														2							0	12	1,500	
Alameda		1																				2	16	13,500	
Anaheim																						1	6	6,000	
Anderson																						0	3	1,000	
Antioch and vicinity															1							3	0	3,000	
Arbuckle and vicinity																						1	3	500	
Auburn																						1	2	1,601	
Bakersfield							3	1									1					1	12	4,800	
Benicia																						1	1	3,000	
Berkeley													1									1	8	10,000	
Biggs and vicinity							1															1	1	1,000	
Bishop and vicinity																1						4	1	1,500	
Calico																						1	0	500	
Carpenteria																						1	0	800	
Cedarville																						1	1	800	
Colton and vicinity																						1	2	2,000	
Cottonwood																						2	2	1,250	
Cloverdale																						1	1	1,500	
Chico and vicinity																						2	3	8,800	
Davisville																						0	0	1,000	
Dixon and vicinity																						2	2	2,500	
Downey and vicinity																						2	5	800	
Downey and vicinity																1						2	5	2,500	
Elk Mills and vicinity																						0	5	1,000	
Elk Grove																						0	0	500	
Eureka and vicinity																						1	6	7,800	
Elsinore and vicinity																						0	0	800	
El Monte and vicinity																						1	1	1,650	
Fort Bidwell and vicinity																						0	0	1,500	
Fresno Flats																						0	2	800	
Fresno																						3	7	10,000	
Folsom																						1	1	1,800	
Galt																						1	1	700	

ABSTRACT FOR JULY, 1893—Continued.

Other Causes	7	1	1	1	2	5	1	2	2	1	2	1	1	423	
Alcoholism	1	1	1	1	1	1	1	1	1	1	1	1	1	8	
Heart Diseases	1	1	1	1	1	1	1	1	1	1	1	1	1	72	
Erysipelas	1	1	1	1	1	1	1	1	1	1	1	1	1	2	
Cancer	1	1	1	1	1	1	1	1	1	1	1	1	1	31	
Cerebro - Spinal Fevers	1	1	1	1	1	1	1	1	1	1	1	1	1	5	
Remittent and Intermittent Fevers	1	1	1	1	1	1	1	1	1	1	1	1	1	9	
Typhoid Fever	1	1	1	1	1	1	1	1	1	1	1	1	1	58	
Typho - Malarial Fever	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Whooping-Cough	1	1	1	1	1	1	1	1	1	1	1	1	1	11	
Smallpox	1	1	1	1	1	1	1	1	1	1	1	1	1	0	
Measles	1	1	1	1	1	1	1	1	1	1	1	1	1	2	
Scarlet Fever	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Croup	1	1	1	1	1	1	1	1	1	1	1	1	1	6	
Diphtheria	1	1	1	1	1	1	1	1	1	1	1	1	1	16	
Other Diseases of St'mach & Bow'ls	1	1	1	1	1	1	1	1	1	1	1	1	1	83	
Cholera Infantum	1	1	1	1	1	1	1	1	1	1	1	1	1	36	
Diarrhoea and Dysentery	1	1	1	1	1	1	1	1	1	1	1	1	1	21	
Congestion of the Lungs	1	1	1	1	1	1	1	1	1	1	1	1	1	6	
Acute Bronchitis	2	1	1	1	1	1	1	1	1	1	1	1	1	15	
Acute Pneumonia	1	1	1	1	1	1	1	1	1	1	1	1	1	45	
Consumption	2	1	1	1	1	1	1	1	1	1	1	1	1	138	
Total Deaths	14	3	3	0	1	0	8	3	4	0	1	4	1	988	
Estimated Population	5,000	5,216	1,200	1,500	1,000	250	17,000	2,800	2,000	850	1,800	5,000	3,000	1,000	824,150
Santa Monica and vicinity	5,000	5,216	1,200	1,500	1,000	250	17,000	2,800	2,000	850	1,800	5,000	3,000	1,000	824,150
Santa Rosa	5,000	5,216	1,200	1,500	1,000	250	17,000	2,800	2,000	850	1,800	5,000	3,000	1,000	824,150
Sausalito	5,000	5,216	1,200	1,500	1,000	250	17,000	2,800	2,000	850	1,800	5,000	3,000	1,000	824,150
Smartsville	5,000	5,216	1,200	1,500	1,000	250	17,000	2,800	2,000	850	1,800	5,000	3,000	1,000	824,150
Sierra Valley	5,000	5,216	1,200	1,500	1,000	250	17,000	2,800	2,000	850	1,800	5,000	3,000	1,000	824,150
Soquel	5,000	5,216	1,200	1,500	1,000	250	17,000	2,800	2,000	850	1,800	5,000	3,000	1,000	824,150
Stockton	5,000	5,216	1,200	1,500	1,000	250	17,000	2,800	2,000	850	1,800	5,000	3,000	1,000	824,150
St. Helena and vicinity	5,000	5,216	1,200	1,500	1,000	250	17,000	2,800	2,000	850	1,800	5,000	3,000	1,000	824,150
Solano County, District No. 2	5,000	5,216	1,200	1,500	1,000	250	17,000	2,800	2,000	850	1,800	5,000	3,000	1,000	824,150
Tehama	5,000	5,216	1,200	1,500	1,000	250	17,000	2,800	2,000	850	1,800	5,000	3,000	1,000	824,150
Truckee and vicinity	5,000	5,216	1,200	1,500	1,000	250	17,000	2,800	2,000	850	1,800	5,000	3,000	1,000	824,150
Tulare City	5,000	5,216	1,200	1,500	1,000	250	17,000	2,800	2,000	850	1,800	5,000	3,000	1,000	824,150
Upper Lake	5,000	5,216	1,200	1,500	1,000	250	17,000	2,800	2,000	850	1,800	5,000	3,000	1,000	824,150
Vallejo	5,000	5,216	1,200	1,500	1,000	250	17,000	2,800	2,000	850	1,800	5,000	3,000	1,000	824,150
Vacaville and Elmira	5,000	5,216	1,200	1,500	1,000	250	17,000	2,800	2,000	850	1,800	5,000	3,000	1,000	824,150
Watsonville	5,000	5,216	1,200	1,500	1,000	250	17,000	2,800	2,000	850	1,800	5,000	3,000	1,000	824,150
Williams	5,000	5,216	1,200	1,500	1,000	250	17,000	2,800	2,000	850	1,800	5,000	3,000	1,000	824,150
Winters and vicinity	5,000	5,216	1,200	1,500	1,000	250	17,000	2,800	2,000	850	1,800	5,000	3,000	1,000	824,150
Totals	5,000	5,216	1,200	1,500	1,000	250	17,000	2,800	2,000	850	1,800	5,000	3,000	1,000	824,150

AUGUST, 1893.

Reports from 108 cities, towns, villages, and sanitary districts, aggregating a population of 761,810, show a total mortality of 873 from all causes during the month of August. This corresponds to a death-rate of 1.14 per month, or 13.68 per annum.

There were 213 deaths due to consumption, 57 to pneumonia, 16 to bronchitis, 8 to congestion of the lungs, 16 to diarrhoea and dysentery, 37 to cholera infantum, 72 to other diseases of the stomach and bowels, 6 to diphtheria, 5 to croup, 3 to whooping-cough, 33 to typhoid fever, 6 to malarial fevers, 2 to cerebro-spinal fever, 27 to cancer, 7 to erysipelas, 67 to diseases of the heart, 5 to alcoholism, and 363 to all other causes.

PREVAILING DISEASES.

Reports of prevailing diseases from 70 towns, villages, and sanitary districts outside of the larger cities, give 28 cases of pneumonia, 84 of bronchitis, 34 of pleuritis, 7 of congestion of the lungs, 164 of diarrhoea, 91 of dysentery, 57 of cholera morbus, 67 of cholera infantum, 28 of diphtheria, 3 of croup, 22 of scarlatina, 31 of measles, 38 of whooping-cough, 25 of la grippe, 102 of typhoid fever, 305 of malarial fevers, 7 of cerebro-spinal fever, 38 of erysipelas, 110 of rheumatism, 68 of neuralgia, 86 of tonsillitis, and 38 of pharyngitis.

The entire State is in a healthy condition, and public sentiment seems to be in favor of public cleanliness, which leads to public health. This is manifested in movements by municipalities toward the construction of much-needed systems of sewers, the erection of garbage crematories, and the procurement of better water supplies.

We are again called upon to congratulate the health authorities for stamping out Asiatic cholera at Jersey City during August. Lateness of the season makes it reasonably certain that another year must elapse before we are again threatened. Nothing can be more certain than that the very extensive and thorough precautions taken by our Government in preventing its entry have proved effective during the summer; but the incident at Jersey City shows the danger of permitting, by municipal authority, the landing of a cargo of fruit from an infected ship coming from an infected port.

ABSTRACT FOR AUGUST, 1893—Continued.

Other Causes	7	1		2		1	12		1	1		1	3	4		1	3	1	1		363						
Alcoholism.....	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	5						
Heart Diseases	1	1	|	|	|	|	2	|	|	|	|	|	1	|	|	1	|	|	|	|	67						
Erysipelas.....	|	1	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	7						
Cancer .....	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	1	|	|	|	|	27						
Cerebro - Spinal Fevers.....	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	2						
Remittent and Intermittent Fevers.....	|	|	|	1	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	6						
Typhoid Fever ....	|	2	|	|	1	|	12	|	|	|	|	|	|	|	|	1	|	|	|	|	38						
Typho - Malarial Fever.....	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	...						
Whooping-Cough..	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	3						
Smallpox .....	|	+	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	0						
Measles.....	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	0						
Scarlet Fever .....	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	0						
Croup.....	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	5						
Diphtheria .....	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	6						
Other Diseases of St'mach & Bow'ls	|	|	1	|	|	|	1	|	1	|	|	1	|	|	|	1	|	|	|	|	72						
Cholera Infantum.	|	|	|	|	|	|	1	|	|	|	|	|	|	|	|	|	|	|	|	|	37						
Diarrhoea and Dysentery.....	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	16						
Congestion of the Lungs.....	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	8						
Acute Bronchitis..	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|	16						
Acute Pneumonia.	1	|	|	|	1	|	|	|	|	1	|	|	|	|	|	|	|	|	|	|	57						
Consumption.....	|	|	|	|	1	|	4	|	|	|	|	|	1	1	|	|	|	|	|	|	213						
Total Deaths	9	5	0	1	5	0	19	0	1	1	0	1	5	5	1	0	4	1	1	0	873						
Estimated Population	12,000	6,216	1,000	1,200	3,000	1,000	17,000	2,000	850	240	1,500	1,300	5,000	2,000	300	6,000	7,000	4,500	3,000	1,000	761,810						
	Santa Cruz and vicinity	Santa Rosa.....	Santa Maria	Sausalito.....	Seima and vicinity	Sierra Valley	Sisson.....	Stockton.....	Solano County, District No. 2.	Susanville	Soquel	Smartsville	Truckee and vicinity	Trinity County	Tulare City	Upper Lake	Vallejo.....	Ventura and vicinity	Wacaville and Elmira	Watsonville and vicinity	Wheatland.....	Winters and vicinity	Weaverville.....	Williams	Woodbridge	Woodland	Totals

SEPTEMBER, 1893.

Reports from 90 cities, towns, villages, and sanitary districts, aggregating a population of 734,140, show a total mortality of 898 from all causes during the month of September. This corresponds to a death-rate of 1.23 per month, or 14.64 per annum.

There were 140 deaths due to consumption, 46 to acute pneumonia, 23 to acute bronchitis, 12 to congestion of the lungs, 18 to diarrhoea and dysentery, 24 to cholera infantum, 76 to other diseases of the stomach and bowels, 12 to diphtheria, 1 to croup, 1 to measles, 2 to whooping-cough, 32 to typhoid fever, 6 to malarial fevers, 4 to cerebro-spinal fever, 32 to cancer, 74 to diseases of the heart, 7 to alcoholism, and 388 to all other causes.

Los Angeles reports 5 deaths from typhus fever. Up to this time it was not generally known that this extremely contagious disease had obtained a foothold in California. There was one death from leprosy at Downieville.

PREVAILING DISEASES.

Reports of prevailing diseases from 57 towns, villages, and sanitary districts outside of the larger towns, give 23 cases of pneumonia, 112 of bronchitis, 32 of pleurisy, 18 of congestion of the lungs, 258 of diarrhoea, 59 of dysentery, 42 of cholera morbus, 43 of cholera infantum, 18 of diphtheria, 15 of croup, 14 of scarlatina, 12 of measles, 16 of whooping-cough, 13 of la grippe, 98 of typhoid fever, 369 of malarial fevers, four of cerebro-spinal fever, 18 of erysipelas, 123 of neuralgia, 95 of rheumatism, and 135 of tonsillitis and pharyngitis.

La grippe has made its appearance quite early in the season. That it has not produced fatalities is not so much due to the mildness of the epidemic as to the unirritating condition of the weather.

Knights Ferry.....	1,500	0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
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OCTOBER, 1893.

Reports from 83 cities, towns, villages, and sanitary districts, aggregating a population of 784,457, show a total mortality of 987 from all causes during the month of October. This corresponds to a death-rate of 1.25 per 1,000 per month, or 15.00 per 1,000 per annum.

There were 142 deaths due to consumption, 86 to pneumonia, 28 to bronchitis, 8 to congestion of the lungs, 10 to diarrhoea and dysentery, 23 to cholera infantum, 67 to other diseases of the stomach and bowels, 13 to diphtheria, 5 to croup, 1 to scarlatina, 2 to whooping-cough, 31 to typhoid fever, 11 to malarial fevers, 5 to cerebro-spinal fever, 31 to cancer, 1 to erysipelas, 75 to heart diseases, 11 to alcoholism, and 437 to all other causes.

PREVAILING DISEASES.

Reports of prevailing diseases from 51 villages, towns, and sanitary districts outside of the larger cities, give 65 cases of pneumonia, 137 of bronchitis, 34 of pleurisy, 17 of congestion of the lungs, 174 of diarrhoea, 28 of dysentery, 20 of cholera morbus, 32 of cholera infantum, 43 of diphtheria, 30 of croup, 14 of scarlatina, 3 of measles, 15 of whooping-cough, 495 of influenza, 44 of typhoid fever, 293 of malarial fevers, 3 of cerebro-spinal fever, 19 of erysipelas, 96 of rheumatism, 103 of neuralgia, 137 of tonsillitis, 61 of pharyngitis, and 10 of chickenpox.

The Health Officer of Los Angeles desires to correct his report of 5 deaths from typhus fever in that city during September. The deaths should have been reported as due to typhoid fever.

[illegible]

ABSTRACT FOR OCTOBER, 1893—Continued.

Other Causes	1	—	—	1	437	
Alcoholism	—	1	—	—	11	
Heart Diseases	1	1	—	—	75	
Erysipelas	—	—	—	—	1	
Cancer	—	—	—	—	31	
Cerebro - Spinal Fevers	2	1	—	—	5	
Remittent and Intermittent Fevers	—	—	—	—	11	
Typhoid Fever	—	—	—	—	31	
Typho - Malarial Fever	—	—	—	—	—	
Whooping-Cough	—	—	—	—	2	
Smallpox	—	—	—	—	0	
Measles	—	—	—	—	0	
Scarlet Fever	—	—	—	—	1	
Croup	—	—	1	—	5	
Diphtheria	—	—	—	—	13	
Other Diseases of St'mach & Bow'ls	—	—	—	—	67	
Cholera Infantum	—	—	—	—	23	
Diarrhoea and Dysentery	—	—	—	—	10	
Congestion of the Lungs	—	—	—	—	8	
Acute Bronchitis	—	—	—	—	28	
Acute Pneumonia	2	1	—	—	86	
Consumption	1	—	—	3	142	
Total Deaths	7	4	0	5	987	
Estimated Population	3,000	1,000	1,300	3,500	784,457	
Watsonville and vicinity						
Wheatland						
Weaverville						
Woodbridge						
Woodland						
Totals						

NOVEMBER, 1893.

Reports from 92 cities, towns, villages, and sanitary districts, aggregating a population of 808,049, show a total mortality of 1,098 from all causes during the month of November. This corresponds to a death-rate of 1.35 per 1,000 per month, or 16.20 per 1,000 per annum.

There were 169 deaths due to consumption, 105 to pneumonia, 49 to bronchitis, 11 to congestion of the lungs, 10 to diarrhoea and dysentery, 15 to cholera infantum, 92 to other diseases of the stomach and bowels, 13 to diphtheria, 3 to croup, 1 to scarlatina, 1 to measles, 7 to whooping-cough, 30 to typhoid fever, 6 to remittent and intermittent fevers, 1 to cerebro-spinal fever, 28 to cancer, 2 to erysipelas, 80 to diseases of the heart, 9 to alcoholism, and 486 to other causes, 10 being from la grippe.

PREVAILING DISEASES.

Reports of prevailing diseases from 67 villages, towns, and sanitary districts outside of the larger cities, give 167 cases of pneumonia, 290 of bronchitis, 63 of pleurisy, 39 of congestion of the lungs, 159 of diarrhoea, 22 of dysentery, 20 of cholera morbus, 16 of cholera infantum, 32 of diphtheria, 27 of croup, 20 of scarlatina, 27 of measles, 37 of whooping-cough, 822 of influenza, 59 of typhoid fever, 179 of malarial fevers, 2 of cerebro-spinal fever, 33 of erysipelas, 147 of rheumatism, 153 of neuralgia, 188 of tonsilitis, 116 of pharyngitis, and 4 of chickenpox.

La grippe is generally prevalent over the area reported from.

CORRECTED REPORTS.

This report, especially from the principal cities and towns in the State, is made from corrected reports for the month of November. Letters have been sent to nearly all of the Health Officers of the principal places, and replies have been received justifying the figures herein given. It is earnestly desired that the estimated population of each town be given in figures by the local Health Officer on his report blank each month, so that if a question should arise, the report can be produced with the original figures upon it. There is no desire on the part of the State Board of Health to minimize the population of any town or city, but it is anxious to obtain, as nearly as possible, the exact population of each place or district reported from.

DANGER FROM SMALLPOX.

Reports from some Eastern and Middle States show that smallpox is epidemic in certain localities. In some places it has produced frightful ravages, and there seems to be no diminution in its prevalence, notwithstanding that most stringent measures have been taken in limiting its spread. In view of the fact that in a few weeks California will receive several thousand visitors from different parts of the Union, it would be well to advise vaccination of all those who are unprotected, and a revaccination of all those who have not been vaccinated during recent years. Nothing could be more injurious to California during the winter than an epidemic of smallpox. It should be urged upon the people that nothing will limit its spread but vaccination.

Abstract of the Reports of Deaths and their Causes in the following Cities and Towns of California during November, 1893.

	Other Causes	Alcoholism.....	Heart Diseases	Erysipelas	Cancer	Cerebro - Spinal Fevers.....	Remittent and Intermittent Fevers	Typhoid Fever	Typho - Malarial Fever.....	Whooping-Cough..	Smallpox	Measles.....	Scarlet Fever	Croup.....	Diphtheria	Other Diseases of St'mach & Bow'ls	Cholera Infantum.	Diarrhoea and Dysentery.....	Congestion of the Lungs.....	Acute Bronchitis..	Acute Pneumonia.	Consumption.....	Total Deaths	Estimated Population	
Alameda.....	5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	15	13,500	Alameda.....
Anaheim and vicinity.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	1	6,000	Anaheim and vicinity.....
Anderson.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	1	850	Anderson.....
Arbuckle.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	1	500	Arbuckle.....
Auburn.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	1	1,801	Auburn.....
Azusa and vicinity.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	1	2,300	Azusa and vicinity.....
Bakersfield and vicinity.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	1	4,800	Bakersfield and vicinity.....
Benicia and vicinity.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	1	3,000	Benicia and vicinity.....
Berkeley.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	1	10,000	Berkeley.....
Biggs and vicinity.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	1	1,000	Biggs and vicinity.....
Bishop and vicinity.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	1	1,800	Bishop and vicinity.....
Calico and vicinity.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	1	500	Calico and vicinity.....
Concord.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	1	500	Concord.....
Colton and vicinity.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	1	2,000	Colton and vicinity.....
College City.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	1	500	College City.....
Cottonwood and vicinity.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	1	1,250	Cottonwood and vicinity.....
Cloverdale.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	1	1,200	Cloverdale.....
Chico and vicinity.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	1	8,880	Chico and vicinity.....
Davisville.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	1	1,000	Davisville.....
Dixon and vicinity.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	1	2,500	Dixon and vicinity.....
Downieville and vicinity.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	1	800	Downieville and vicinity.....
Downey and vicinity.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	1	2,800	Downey and vicinity.....
Etna Mills and vicinity.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	1	1,000	Etna Mills and vicinity.....
El Monte and vicinity.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	1	2,000	El Monte and vicinity.....
Elk Grove.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	1	500	Elk Grove.....
Eureka and vicinity.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	1	7,800	Eureka and vicinity.....
Fort Bidwell and vicinity.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	1	1,500	Fort Bidwell and vicinity.....
Fresno.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	1	10,000	Fresno.....
Fresno Flats.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	1	800	Fresno Flats.....
Folsom.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	1	1,980	Folsom.....
Galt.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	1	700	Galt.....
Grass Valley and vicinity.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	1	7,000	Grass Valley and vicinity.....
Gilroy.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	1	2,000	Gilroy.....

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ABSTRACT FOR NOVEMBER, 1893—Continued.

Other Causes	17	1	2	3	1	1	1	1	463
Alcoholism									9
Heart Diseases				2				1	80
Erysipelas									2
Cancer	1						1		28
Cerebro - Spinal Fevers									1
Remittent and Intermittent Fevers				1					6
Typhoid Fever			1	1					30
Typho - Malarial Fever									
Whooping-Cough									7
Smallpox									0
Measles								1	1
Scarlet Fever								1	1
Croup									3
Diphtheria	1								13
Other Diseases of St'mach & Bow'ls	3							1	92
Cholera Infantum				1					15
Diarrhoea and Dysentery									10
Congestion of the Lungs									11
Acute Bronchitis				1					49
Acute Pneumonia	6	3		1					105
Consumption	5			1					169
Total Deaths	33	0	3	4	1	2	0	2	1,038
Estimated Population	17,000	2,000	850	350	1,300	5,000	300	6,000	808,049
Stockton	17,000								
St. Helena and vicinity	2,000								
Susanville	850								
Tehama	350								
Truckee and vicinity	1,300								
Trinity County	5,000								
Upper Lake	300								
Vallejo	6,000								
Vacaville and vicinity	4,500								
Watsonville and vicinity	3,000								
Winters and vicinity	1,000								
Williams	600								
Woodbridge	300								
Woodland	3,500								
Totals	808,049								

DECEMBER, 1893.

Reports from 90 cities, towns, villages, and sanitary districts, aggregating a population of 814,739, show a mortality of 1,105 from all causes during the month of December. This corresponds to a death-rate of 1.35 per 1,000, or 16.20 per 1,000 per annum.

There were 161 deaths due to consumption, 112 to pneumonia, 46 to bronchitis, 11 to congestion of the lungs, 10 to diarrhoea and dysentery, 6 to cholera infantum, 56 to other diseases of the stomach and bowels, 24 to diphtheria, 4 to croup, 4 to scarlatina, 5 to whooping-cough, 33 to typhoid fever, 4 to malarial fevers, 6 to cerebro-spinal fever, 30 to cancer, 5 to erysipelas, 96 to diseases of the heart, 13 to alcoholism, 479 to all other causes, 30 being from la grippe, the mortality from that cause having increased from 10 in November to 30 in December.

PREVAILING DISEASES.

Reports of prevailing diseases from 65 villages, towns, and sanitary districts outside of the larger cities, give 105 cases of pneumonia, 203 of bronchitis, 54 of pleurisy, 29 of congestion of the lungs, 132 of diarrhoea, 38 of dysentery, 5 of cholera morbus, 6 of cholera infantum, 27 of diphtheria, 30 of croup, 18 of scarlatina, 20 of measles, 39 of whooping-cough, 637 of influenza, 73 of typhoid fever, 196 of malarial fevers, 11 of cerebro-spinal fever, 34 of erysipelas, 134 of rheumatism, 107 of neuralgia, 110 of tonsillitis, 97 of pharyngitis, and 10 of rubella.

Measles was epidemic at Bishop, and whooping-cough at Anaheim and Cloverdale. La grippe is more or less prevalent over the entire area of the State.

Abstract of the Reports of Deaths and their Causes in the following Cities and Towns of California during December, 1893.

Other Causes	4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
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[illegible]

ABSTRACT FOR DECEMBER, 1893—Continued.

Other Causes			3	3	1	3	1			1		479
Alcoholism .....	|	|	|	|	|	|	|	|	|	|	|	13
Heart Diseases .....	|	|	1	|	1	1	|	|	|	|	|	86
Erysipelas .....	|	|	|	|	|	|	|	|	|	|	|	5
Cancer .....	|	|	1	|	|	|	|	|	|	|	|	30
Cerebro - Spinal Fevers .....	|	|	|	|	|	|	1	|	|	|	|	6
Remittent and Intermittent Fevers .....	|	|	|	|	|	|	|	|	|	|	|	4
Typhoid Fever .....	|	|	|	|	|	|	|	|	1	|	|	33
Typho - Malarial Fever .....	|	|	|	|	|	|	|	|	|	|	|	5
Whooping-Cough .....	|	|	|	|	|	|	|	|	|	|	|	0
Smallpox .....	|	|	|	|	|	|	|	|	|	|	|	0
Measles .....	|	|	|	|	|	|	|	|	|	|	|	0
Scarlet Fever .....	|	|	|	|	|	|	|	|	|	|	|	4
Croup .....	|	|	|	|	|	|	|	|	|	|	|	4
Diphtheria .....	|	|	|	|	|	|	|	|	|	|	|	24
Other Diseases of St'mach & Bow'ls .....	|	|	|	|	2	|	|	1	|	|	|	56
Cholera Infantum .....	|	|	|	|	|	|	|	|	|	|	|	6
Diarrhoea and Dysentery .....	|	|	|	|	|	|	|	|	|	|	|	10
Congestion of the Lungs .....	|	|	|	|	|	|	|	|	|	|	|	11
Acute Bronchitis .....	|	|	|	|	2	|	|	|	|	|	|	46
Acute Pneumonia .....	|	|	1	|	1	2	|	1	|	|	|	112
Consumption .....	|	|	|	1	3	3	1	1	|	|	|	161
Total Deaths	0	0	6	3	4	13	2	2	1	1	1	1,106
Estimated Population	350	1,300	5,000	300	6,000	9,000	4,500	3,000	1,000	600	300	814,739
Tehama	350	1,300	5,000	300	6,000	9,000	4,500	3,000	1,000	600	300	814,739
Truckee and vicinity	350	1,300	5,000	300	6,000	9,000	4,500	3,000	1,000	600	300	814,739
Trinity County	350	1,300	5,000	300	6,000	9,000	4,500	3,000	1,000	600	300	814,739
Upper Lake	350	1,300	5,000	300	6,000	9,000	4,500	3,000	1,000	600	300	814,739
Vallejo	350	1,300	5,000	300	6,000	9,000	4,500	3,000	1,000	600	300	814,739
Ventura and vicinity	350	1,300	5,000	300	6,000	9,000	4,500	3,000	1,000	600	300	814,739
Vacaville and Elmira	350	1,300	5,000	300	6,000	9,000	4,500	3,000	1,000	600	300	814,739
Watsonville and vicinity	350	1,300	5,000	300	6,000	9,000	4,500	3,000	1,000	600	300	814,739
Wheatland	350	1,300	5,000	300	6,000	9,000	4,500	3,000	1,000	600	300	814,739
Williams	350	1,300	5,000	300	6,000	9,000	4,500	3,000	1,000	600	300	814,739
Woodbridge	350	1,300	5,000	300	6,000	9,000	4,500	3,000	1,000	600	300	814,739
Woodland	350	1,300	5,000	300	6,000	9,000	4,500	3,000	1,000	600	300	814,739
Totals	350	1,300	5,000	300	6,000	9,000	4,500	3,000	1,000	600	300	814,739

JANUARY, 1894.

Reports from 97 cities, towns, villages, and sanitary districts, aggregating a population of 831,551, show a mortality of 1,234, or a death-rate of 1.48 per 1,000 for January, or 17.76 per 1,000 per annum.

There were 209 deaths from consumption, 113 from pneumonia, 44 from acute bronchitis, 9 from congestion of the lungs, 1 from diarrhoea, 2 from cholera infantum, 68 from other diseases of the stomach and bowels, 19 from diphtheria, 10 from croup, 14 from whooping-cough, 28 from typhoid fever, 4 from malarial fevers, 37 from cancer, 5 from erysipelas, 115 from diseases of the heart, 7 from alcoholism, 549 from other causes, 19 of which were from la grippe.

PREVAILING DISEASES.

Reports of prevailing diseases from 60 localities outside of the larger towns and cities, give 114 cases of pneumonia, 203 of bronchitis, 47 of pleurisy, 23 of congestion of the lungs, 83 of diarrhoea, 21 of dysentery, 8 of cholera morbus, 11 of cholera infantum, 17 of diphtheria, 36 of croup, 7 of scarlatina, 63 of measles, 81 of whooping-cough, 571 of la grippe, 34 of typhoid fever, 116 of malarial fevers, 4 of cerebro-spinal fever, 36 of erysipelas, 153 of rheumatism, 159 of neuralgia, 104 of tonsillitis, and 75 of pharyngitis.

Measles was epidemic at Elkhorn, Mariposa County. Whooping-cough was epidemic at Cloverdale, College City, and Anaheim. The fatality from this disease of childhood during the month of January was large, 14 having died from that cause. Chickenpox is epidemic at Anaheim.

SMALLPOX IN THE EAST.

This disease is reported as prevailing quite generally in the East, the numbers in the aggregate reaching high figures. The western limit by last report is the State of Iowa.

It may not be amiss to again urge a revival of vaccination. Smallpox in any household is as disastrous as a fire. City and town authorities should provide free vaccination for all who will avail themselves of it, without waiting for an announcement of the unwelcome advent of the disease.

STATE SANITARY CONVENTION.

The second annual State Sanitary Convention will be held at San José on the afternoon and evening of Monday, April 16th, in the hall to be occupied on the following day by the State Medical Society. The convention will be held under the auspices of the State Board of Health, which will provide for the necessary expenses. The invitation is extended to all medical men, Boards of Health, city and sanitary engineers, clergymen, and all others who take an active interest in preventive measures against disease. As announced in a circular letter in December, the following resolution will be introduced:

"Resolved, That hereafter consumption (and other diseases due to the *Bacillus tuberculosis*) should be included in the list of diseases dangerous to the public health, requiring notice by householders and physicians to the local Health Officer, as soon as recognized."

It is confidently expected that this subject will be ably discussed. Short papers are solicited on any branch of sanitary science, those having a local bearing being especially desirable. These papers, with all the proceedings of the convention, will be published in pamphlet form for general distribution. The titles of papers should be forwarded early to facilitate the completion of a suitable programme. A circular letter has been sent to a large number, but as it may not reach all who might wish to take part, a general invitation is extended, and papers on the subjects suggested earnestly solicited.

[illegible]

ABSTRACT FOR JANUARY, 1894—Continued.

Other Causes	2	1	8	3	1	2	1	4	1	6	5	1	1	4	549
Alcoholism	1	1	1	1	1	1	1	1	1	1	1	1	1	1	7
Heart Diseases	1	2	1	1	1	1	1	1	1	1	1	1	1	1	115
Erysipelas	1	1	1	1	1	1	1	1	1	1	1	1	1	1	5
Cancer	1	1	1	1	1	1	1	1	1	1	1	1	1	1	37
Cerebro - Spinal Fevers	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
Remittent and Intermittent Fevers	1	1	1	1	1	1	1	1	1	1	1	1	1	1	4
Typhoid Fever	1	1	1	1	1	1	1	1	1	1	1	1	1	1	28
Typho - Malarial Fever	1	1	1	1	1	1	1	1	1	1	1	1	1	1	...
Whooping-Cough	1	1	1	1	1	1	1	1	1	1	1	1	1	1	14
Smallpox	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
Measles	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
Scarlet Fever	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
Croup	1	1	1	1	1	1	1	1	1	1	1	1	1	1	10
Diphtheria	1	1	1	1	1	1	1	1	1	1	1	1	1	1	19
Other Diseases of St'mach & Bow'ls	1	1	1	1	1	1	1	1	1	1	1	1	1	1	68
Cholera Infantum	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2
Diarrhoea and Dysentery	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Congestion of the Lungs	1	1	1	1	1	1	1	1	1	1	1	1	1	1	9
Acute Bronchitis	1	1	1	1	1	1	1	1	1	1	1	1	1	1	44
Acute Pneumonia	1	1	1	1	1	1	1	1	1	1	1	1	1	1	113
Consumption	1	1	1	1	1	1	1	1	1	1	1	1	1	1	209
Total Deaths	1	2	2	18	4	1	0	2	2	6	1	3	11	7	1,224
Estimated Population	2,000	5,469	3,000	17,000	2,000	850	250	300	1,300	5,000	4,000	300	6,000	7,000	831,551
Solano County, District No. 2	2,000	5,469	3,000	17,000	2,000	850	250	300	1,300	5,000	4,000	300	6,000	7,000	831,551
Sutter County	2,000	5,469	3,000	17,000	2,000	850	250	300	1,300	5,000	4,000	300	6,000	7,000	831,551
Selma and vicinity	2,000	5,469	3,000	17,000	2,000	850	250	300	1,300	5,000	4,000	300	6,000	7,000	831,551
Stockton	2,000	5,469	3,000	17,000	2,000	850	250	300	1,300	5,000	4,000	300	6,000	7,000	831,551
St. Helena and vicinity	2,000	5,469	3,000	17,000	2,000	850	250	300	1,300	5,000	4,000	300	6,000	7,000	831,551
Susanville	2,000	5,469	3,000	17,000	2,000	850	250	300	1,300	5,000	4,000	300	6,000	7,000	831,551
Soquel	2,000	5,469	3,000	17,000	2,000	850	250	300	1,300	5,000	4,000	300	6,000	7,000	831,551
Tehama	2,000	5,469	3,000	17,000	2,000	850	250	300	1,300	5,000	4,000	300	6,000	7,000	831,551
Truckee and vicinity	2,000	5,469	3,000	17,000	2,000	850	250	300	1,300	5,000	4,000	300	6,000	7,000	831,551
Trinity County	2,000	5,469	3,000	17,000	2,000	850	250	300	1,300	5,000	4,000	300	6,000	7,000	831,551
Tulare City	2,000	5,469	3,000	17,000	2,000	850	250	300	1,300	5,000	4,000	300	6,000	7,000	831,551
Upper Lake	2,000	5,469	3,000	17,000	2,000	850	250	300	1,300	5,000	4,000	300	6,000	7,000	831,551
Valejo	2,000	5,469	3,000	17,000	2,000	850	250	300	1,300	5,000	4,000	300	6,000	7,000	831,551
Ventura and vicinity	2,000	5,469	3,000	17,000	2,000	850	250	300	1,300	5,000	4,000	300	6,000	7,000	831,551
Vacaville and vicinity	2,000	5,469	3,000	17,000	2,000	850	250	300	1,300	5,000	4,000	300	6,000	7,000	831,551
Watsonville and vicinity	2,000	5,469	3,000	17,000	2,000	850	250	300	1,300	5,000	4,000	300	6,000	7,000	831,551
Williams	2,000	5,469	3,000	17,000	2,000	850	250	300	1,300	5,000	4,000	300	6,000	7,000	831,551
Woodbridge	2,000	5,469	3,000	17,000	2,000	850	250	300	1,300	5,000	4,000	300	6,000	7,000	831,551
Woodland	2,000	5,469	3,000	17,000	2,000	850	250	300	1,300	5,000	4,000	300	6,000	7,000	831,551
Totals	1,224	209	113	44	9	1	2	68	19	10	0	0	0	0	7

FEBRUARY, 1894.

Reports from 89 cities, towns, villages, and sanitary districts, aggregating a population of 810,140, show a mortality of 1,011, or a death-rate of 1.24 per 1,000 for February, or 14.88 per 1,000 per annum.

There were 206 deaths from consumption, 98 from pneumonia, 31 from bronchitis, 10 from congestion of the lungs, 2 from diarrhoea, 4 from cholera infantum, 52 from other diseases of the stomach and bowels, 9 from diphtheria, 7 from croup, 4 from scarlet fever, 7 from whooping-cough, 14 from typhoid fever, 1 from malarial fevers, 5 from cerebro-spinal fever, 26 from cancer, 2 from erysipelas, 86 from diseases of the heart, 4 from alcoholism, and 445 from other causes, 8 of which were from la grippe.

PREVAILING DISEASES.

Reports of prevailing diseases from 57 localities outside of the larger towns and cities, give 123 cases of pneumonia, 193 of bronchitis, 51 of pleurisy, 30 of congestion of the lungs, 66 of diarrhoea, 27 of dysentery, 6 of cholera morbus, 6 of cholera infantum, 18 of diphtheria, 29 of croup, 31 of scarlatina, 85 of measles, 52 of whooping-cough, 407 of la grippe, 34 of typhoid fever, 117 of malarial fevers, 7 of cerebro-spinal fever, 25 of erysipelas, 132 of rheumatism, 79 of neuralgia, 147 of tonsillitis, and 92 of pharyngitis.

Measles was epidemic at Fresno Flats. Whooping-cough was epidemic at Arbuckle, Anaheim, and Elk Grove. Chicken-pox is epidemic at Vacaville and Elmira.

STATE SANITARY CONVENTION.

As previously announced, the second annual State Sanitary Convention will be held at San José on Monday, April 16th, under the auspices of the State Board of Health. A sufficient number of papers on topics relating to preventive medicine have been promised to insure a meeting of more than ordinary interest. The invitation to attend is extended to all medical men and others interested in the subject. Those having papers to present are requested to forward the title to the Secretary of the State Board of Health, so that a programme may be completed at an early date. The State Board will defray the incidental expenses of the meeting and publish the proceedings, with the papers, for general distribution. Such conventions are being held in most of the progressive States of the Union, and California may indulge in a pardonable pride at the result of her first venture in this direction, in 1893. There is reason for the prediction that the second annual convention will in no way be eclipsed by the first, and as the published proceedings must, in a measure, be regarded as an index of the standard of our aims, if not of our achievements, in the direction of State or preventive medicine, our local pride should be enlisted to give vigor and vitality to our voices in expressing our convictions on the subjects that shall properly come before us.

[illegible]

MARCH, 1894.

Reports from 88 cities, towns, villages, and sanitary districts, aggregating a population of 773,287, show a mortality of 1,074—a death-rate of 1.38 per 1,000 for March, or 16.56 per 1,000 per annum.

There were 193 deaths from consumption, 111 from pneumonia, 37 from bronchitis, 9 from congestion of the lungs, 2 from diarrhœa, 1 from cholera infantum, 57 from other diseases of the stomach and bowels, 7 from diphtheria, 7 from croup, 1 from scarlatina, 7 from whooping-cough, 12 from typhoid fever, 2 from malarial fevers, 10 from cerebro-spinal fever, 44 from cancer, 2 from erysipelas, 84 from diseases of the heart, 5 from alcoholism, and 483 from other causes, 11 of which were from la grippe.

PREVAILING DISEASES.

Reports of prevailing diseases from 55 localities outside of the larger towns and cities give 81 cases of pneumonia, 128 of bronchitis, 47 of pleurisy, 22 of congestion of the lungs, 65 of diarrhœa, 17 of dysentery, 6 of cholera morbus, 6 of cholera infantum, 9 of diphtheria, 31 of croup, 13 of scarlatina, 62 of measles, 92 of whooping-cough, 214 of la grippe, 10 of typhoid fever, 92 of malarial fevers, 2 of cerebro-spinal fever, 25 of erysipelas, 122 of rheumatism, 85 of neuralgia, 116 of tonsilitis, and 61 of pharyngitis.

Measles was epidemic at Bishop, Madera, and in Fresno County. Whooping-cough was epidemic at Anaheim, College City, and Gridley. Chickenpox is epidemic at Fresno Flats, Knight's Ferry, Fallbrook, and South Pasadena.

REGISTRY OF BIRTHS, MARRIAGES, AND DEATHS.

The laws of the State with reference to registration of births, marriages, and deaths have, in many counties, been partially or totally ignored. Some counties have regularly returned births and deaths, but none have reported marriages.

There is a penalty of \$50 for failure, neglect, or refusal to perform any of the duties relating to registration. The importance of registration is so evident that it need not be urged. It is the law and should be obeyed. A vigorous effort will be made to enforce the law in every county in California. It is necessary to call upon the public press for assistance in this matter. Without the aid of the press, the general publicity of the laws cannot be made. Neither will the glaring failure, neglect, or refusal of persons to obey the law be much noticed unless the matter is taken up by the press of the State. It is the duty of the District Attorney to prosecute such cases, and in case of his failure to do so, the county Boards of Supervisors must be appealed to. The proper registers of births, marriages, and deaths have been prepared, and have been distributed by the honorable Secretary of State to every county in the State, and no effort in the power of the State Board of Health, or in that of its membership as individuals, will be spared in enforcing a compliance with the law.

The sections of the Political Code relating to registration are hereto appended:

SEC. 3074. All persons who perform the marriage ceremony must keep a registry of the time of each marriage so celebrated, the residence, the names in full, the place of birth, the age of each party, and whether either party has ever been before married. [In effect March 16, 1878.]

SEC. 3075. All physicians and professional midwives must keep a registry of the time of each birth at which they assist professionally, the sex, race, and color of the child, and the names and residence of the parents.

SEC. 3076. Physicians who attend deceased persons in their last sickness, clergymen who officiate at a funeral, Coroners who hold inquests, sextons and undertakers who bury deceased persons, must each keep a registry of the name, age, residence, and time of death of such person. [Approved March 30th; in effect July 6, 1874.]

SEC. 3077. All persons registering marriages, births, or deaths, must quarterly file with the County Recorder a certified copy of their register. All such certificates must specify, as near as may be ascertained, the name in full, age, occupation, term of residence in the city or county, birthplace, condition (whether single or married, widow or widower), sex, race, color, last place of residence, and cause of death of all decedents. [In effect March 16, 1878.]

SEC. 3078. If at birth no physician or midwife attend, then the parents must make the report.

SEC. 3079. The Recorder must keep separate registers, to be known as the "Register of Marriages," the "Register of Births," and the "Register of Deaths," in which the marriages, births, and deaths certified to him must be numbered in the order in which they are reported to him. There must be stated in each register, in separate columns, properly headed, the various facts contained in the certificates, and the name and official or clerical position of the person making the report. The Recorder must carefully examine each report, and register the same marriage, birth, or death but once, although it may be reported by different persons. [In effect March 16, 1878.]

SEC. 3080. The County Recorder must, every three months, transmit to the Secretary of the State Board of Health, at Sacramento City, a certified abstract of the registers of births, marriages, and deaths, prepared in the manner prescribed in the instructions of the Secretary, and upon the blanks to be furnished by him for that purpose.

SEC. 3081. County Recorders, in those counties where their compensation is by fees, shall be allowed by the Board of Supervisors a fee of not exceeding ten cents for each

name reported, to be paid out of the General Fund of the county ; and in those counties where their compensation is by a fixed salary, the duties in this chapter provided shall be performed without compensation other than such salary. [In effect March 16, 1878.]

SEC. 3082. Any person on whom a duty is imposed by this chapter, who fails, neglects, or refuses to perform the same as herein required, is liable to a penalty of fifty dollars, to be recovered by the District Attorney of the proper county, for the use of the General Fund of such county.

SEC. 3083. The Secretary of the State Board of Health must prepare blank forms of said registers for the State Printer, who must print as many copies as the said Secretary shall direct, and deliver the same to the Secretary of State, who shall forward the same, from time to time, and in such numbers as shall be directed by the Secretary first mentioned, to the County Recorders of the several counties, who must carefully keep and distribute the same to the persons in the county who are required to keep the registers and make the reports provided in this chapter. [In effect March 16, 1878.]

SEC. 3084. No person shall inter, cremate, or otherwise dispose of any human body, in any city, county, or city and county, without first having obtained a permit therefor. In incorporated cities, or counties, or cities and counties, the permit must be obtained from the person authorized to grant the same by any law, ordinance, or resolution passed for that purpose. But in the absence of such law, ordinance, or resolution, the permit must be obtained from either the Coroner, Health Officer, or Board of Health, or if the Coroner be absent, then from the Health Officer or Board of Health ; and if there be no Board of Health or Health Officer, then from a Justice of the Peace. The person applying for a permit must produce and file with the officer issuing the permit a certificate signed by a physician, or a Coroner, or two reputable citizens, setting forth as near as possible the name, age, color, place of birth, occupation, date, locality, and cause of death of deceased. And no permit shall be granted without the production of such certificate. Such permit must be filed with the County Recorder, and the person so filing is entitled to the compensation provided for in section three thousand and seventy-seven of this Code, but if any other registration of the death of the deceased shall have been made, the Recorder must record the name but once. [Approved February 25, 1889 ; in effect thirty days after.]

[illegible]

APRIL, 1894.

Reports from 86 cities, towns, villages, and sanitary districts, aggregating a population of 898,453, show a mortality of 1,118—a death-rate of 1.25 per 1,000 for April, or 15.00 per 1,000 per annum.

There were 210 deaths from consumption, 101 from pneumonia, 36 from bronchitis, 14 from congestion of the lungs, 8 from diarrhoea, 8 from cholera infantum, 73 from other diseases of the stomach and bowels, 17 from diphtheria, 6 from croup, 3 from scarlatina, 2 from measles, 7 from whooping-cough, 8 from typhoid fever, 1 from malarial fevers, 10 from cerebro-spinal fever, 31 from cancer, 7 from erysipelas, 96 from diseases of the heart, 6 from alcoholism, and 474 from other causes, 9 of which were from la grippe.

PREVAILING DISEASES.

Reports of prevailing diseases from 55 localities outside of the larger towns and cities give 48 cases of pneumonia, 152 of bronchitis, 45 of pleurisy, 17 of congestion of the lungs, 141 of diarrhoea, 43 of dysentery, 18 of cholera morbus, 9 of cholera infantum, 18 of diphtheria, 25 of croup, 24 of scarlatina, 38 of measles, 115 of whooping-cough, 179 of la grippe, 14 of typhoid fever, 209 of malarial fevers, 4 of cerebro-spinal fever, 25 of erysipelas, 120 of rheumatism, 102 of neuralgia, 152 of tonsilitis, and 75 of pharyngitis.

Measles was epidemic at Bishop and San Rafael. Whooping-cough was epidemic at Cloverdale, College City, Lakeport, and Kelseyville. Chickenpox is epidemic at Knight's Ferry, Cathay's Valley, and at Mount Gaines.

SMALLPOX.

Two cases of smallpox have been reported from Cedarville, Modoc County, and by common report in that remote locality several other cases exist about forty miles from there, with accounts of one death. The authorities at Fort Bidwell and Alturas have ordered vaccine virus, and are prepared to fight the epidemic that is threatened. The necessary quarantine is reported in force. The contagion came by way of Reno, Nevada, across the country to Modoc County, from the East. Having once effected a lodgment in the State, it may not be easily stamped out. Let it again be urged that vaccination is the only protection against smallpox. Sniveling sentimentalists who have in all ages cried out against all progress, argue against vaccination. They should either be silenced or passed in scorn. Human life and the prosperity of families, hamlets, towns, and cities are at stake, and demand prompt and decisive action to prevent fear, panic, death, and loss of trade. Public vaccination should be offered by the authorities of towns and counties.

ABSTRACT FOR APRIL, 1894—Continued.

Other Causes	1	1	1	—	49	2	2	1	—	2	1	1	4	1	7	21	1	2	6	—	1	2	4	26	1	9	216	16	6	—	1		
Alcoholism.....	—	—	—	—	—	—	—	—	—	—	—	—	1	1	—	—	—	—	—	—	—	—	—	—	—	—	2	—	—	—	—		
Heart Diseases	—	—	—	1	5	1	—	—	1	1	1	1	—	1	7	—	1	2	—	1	—	—	5	1	—	52	8	1	—	—	—		
Erysipelas.....	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	—	—	—	—	—		
Cancer	—	—	—	—	—	1	—	—	—	—	—	—	—	—	3	—	1	—	—	—	—	—	1	—	—	17	4	2	—	1	—		
Cerebro - Spinal Fevers.....	—	—	—	—	—	—	—	—	—	—	—	—	—	1	2	—	—	—	—	—	—	—	—	—	—	4	—	—	—	—	—		
Remittent and Intermittent Fevers.....	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
Typhoid Fever	—	—	—	1	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	5	—	—	—	—	—		
Typho - Malarial Fever.....	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
Whooping-Cough.....	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	6	—	—	—	—	—		
Smallpox	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
Measles.....	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Scarlet Fever	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	—	—	—	—	—	
Croup	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1	—	—	—	—	—	—	—	—	—	—	4	—	—	—	—	—	
Diphtheria	—	—	—	1	4	—	—	—	—	—	—	—	—	—	1	1	1	—	—	—	—	—	5	2	—	—	2	—	—	—	—	—	
Other Diseases of St'mach & Bow'ls.....	—	—	—	1	5	—	—	—	—	—	—	3	1	—	1	1	1	—	—	—	—	—	5	2	—	4	38	1	3	—	—	—	
Cholera Infantum.....	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	3	1	1	—	1	—	—	
Diarrhoea and Dysentery.....	—	—	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1	—	3	—	—	—	—	—	—	
Congestion of the Lungs.....	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1	—	—	—	—	—	—	—	—	—	7	—	—	—	—	—	—	
Acute Bronchitis.....	—	—	—	2	—	—	—	—	—	—	—	—	—	—	1	1	—	—	—	—	—	—	2	—	—	—	25	—	—	—	—	—	
Acute Pneumonia.....	—	—	—	12	—	1	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	3	61	—	—	—	—	—	
Consumption.....	—	—	1	19	19	2	—	—	—	—	—	4	5	1	1	—	2	—	1	—	—	57	11	3	7	94	33	8	1	—	1	—	
Total Deaths	1	1	1	2	99	0	3	1	—	4	5	2	1	14	48	7	2	16	—	—	—	57	11	11	19	546	33	8	1	3	2		
Estimated Population	1,500	2,000	2,500	1,200	2,000	65,000	1,200	4,000	2,000	1,000	1,000	2,500	3,000	7,000	1,200	10,000	80,000	2,000	2,500	13,700	1,300	2,000	3,500	1,800	30,000	8,000	18,000	330,000	23,000	4,000	1,240	500	3,800
	Knights Ferry.....	Long Beach and vicinity.....	Livermore and vicinity.....	Lakeport.....	Lodi and vicinity.....	Los Angeles.....	Lockeford and vicinity.....	Marysville.....	Merced.....	Mariposa.....	Middletown.....	Madera and vicinity.....	Monterey.....	Napa and vicinity.....	National City.....	North Temescal and vicinity.....	Oakland.....	Oroville.....	Ontario and vicinity.....	Pasadena and vicinity.....	South Pasadena.....	Pleasanton and vicinity.....	Redlands and vicinity.....	Rio Vista and vicinity.....	Sacramento.....	San Bernardino.....	San Diego.....	San Francisco.....	San José.....	San Luis Obispo.....	San Pedro.....	San Pablo.....	San Rafael.....

[illegible]

MAY, 1894.

Reports from 78 cities, towns, villages, and sanitary districts, aggregating a population of 772,023, show a mortality of 972, a death-rate of 1.26 per 1,000 for May, or 15.12 per 1,000 per annum.

There were 186 deaths from consumption, 76 from pneumonia, 31 from bronchitis, 9 from congestion of the lungs, 6 from diarrhoea, 13 from cholera infantum, 66 from other diseases of the stomach and bowels, 13 from diphtheria, 6 from croup, 3 from scarlatina, 1 from measles, 2 from smallpox, 7 from whooping-cough, 15 from typhoid fever, 1 from malarial fevers, 5 from cerebro-spinal fever, 35 from cancer, 5 from erysipelas, 77 from diseases of the heart, 9 from alcoholism, 424 from other causes, 3 of which were from la grippe and 1 from leprosy.

As will be seen above, Alturas and Cedarville each had a death from smallpox. The epidemic is under control at those points, however, the people having been quite generally vaccinated. Dr. A. Gibson writes from Cedarville, that 30 miles from that place, in Goose Lake Valley, there are 30 cases, with 2 deaths. He says that it has been called chickenpox, the people fearing injury to their business if the truth were told. If it could be generally understood that thorough vaccination was the only reliable safeguard, such mendacious expedients would be more rare. It is better in every way to make no secret of the presence of smallpox, but to proceed at once to stamp it out by isolation of the sick and a successful vaccination of the well persons in any locality. Any other method of procedure in dealing with smallpox will end in confusion and discomfiture, as the secret cannot be kept any longer than enough time to enable the pestilence to get a headway, as difficult of control as a conflagration.

PREVAILING DISEASES.

Reports from 46 localities outside of the larger cities and towns, give 40 cases of pneumonia, 100 of bronchitis, 26 of pleurisy, 6 of congestion of the lungs, 171 of diarrhoea, 74 of dysentery, 24 of cholera morbus, 34 of cholera infantum, 4 of diphtheria, 8 of croup, 10 of scarlatina, 160 of measles, 55 of smallpox, 38 of whooping-cough, 76 of la grippe, 19 of typhoid fever, 202 of malarial fevers, 10 of cerebro-spinal fever, 21 of erysipelas, 84 of rheumatism, 76 of neuralgia, 67 of tonsilitis, and 84 of pharyngitis.

Measles was epidemic at San Rafael, Anaheim, Long Beach, Santa Rosa, and Berkeley.

Chickenpox is epidemic at San Rafael and North Temescal, Oakland Township.

Mumps are epidemic at Anaheim and St. Helena.

Scarlatina is epidemic at Anaheim.

Whooping-cough, in a mild form, is epidemic at Santa Rosa.

Smallpox is epidemic at Willow Ranch, Cedarville, and in Goose Lake Valley.

Santa Paula and vicinity	2,000	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Santa Maria.....	1,000	2	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selma and vicinity	3,000	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stockton	17,000	17	2	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	4	1	1	-	-
St. Helena and vicinity	2,500	2,500	4	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-
Tehama.....	950	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Truckee and vicinity	1,300	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tulare City	4,000	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vallejo	6,000	5	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Watsonville and vicinity	3,000	4	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
Woodbridge.....	300	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Woodland	3,500	3	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Totals.....	772,023	972	168	76	31	9	6	13	68	13	6	3	1	2	7	....	15	1	5	35	5	77	9	424	-	-

JUNE, 1894.

Reports from 60 cities, towns, villages, and sanitary districts, aggregating a population of 759,881, show a mortality of 827, or a death-rate of 1.08 per 1,000 for June, or 12.96 per 1,000 per annum.

There were 148 deaths from consumption, 53 from pneumonia, 26 from acute bronchitis, 5 from congestion of the lungs, 10 from diarrhoea and dysentery, 16 from cholera infantum, 49 from other diseases of the stomach and bowels, 9 from diphtheria, 1 from croup, 2 from scarlatina, 1 from measles, 9 from whooping-cough, 15 from typhoid fever, 3 from malarial fevers, 14 from cerebro-spinal fever, 32 from cancer, 1 from erysipelas, 96 from diseases of the heart, 7 from alcoholism, 3 from la grippe, and 427 from all other causes.

There were no deaths from smallpox, though it is reported as lingering in Goose Lake Valley.

PREVAILING DISEASES.

Reports of prevailing diseases in 32 localities outside the cities and towns, give 28 cases of pneumonia, 64 of bronchitis, 10 of pleuritis, 10 of congestion of the lungs, 154 of diarrhoea, 51 of dysentery, 26 of cholera morbus, 23 of cholera infantum, 2 of diphtheria, 1 of croup, 7 of scarlatina, 27 of measles, 86 of whooping-cough, 29 of la grippe, 25 of typhoid fever, 185 of malarial fevers, 11 of cerebro-spinal fever, 13 of erysipelas, 64 of rheumatism, 41 of neuralgia, 51 of tonsilitis, and 23 of pharyngitis.

Measles was reported epidemic at Long Branch, Pomona, and Anaheim; and whooping-cough at Upper Lake.

Interruption of the mails, by reason of the general strike of employes of the California railroads, has prevented a full report for June, but it is believed that the average of mortality is about as given above, which is very low, and would indicate a highly favorable condition of health throughout the State.

Abstract of the Reports of Deaths and their Causes in the following Cities and Towns of California during June, 1894.

Other Causes	2	2	1	—	1	4	3	1	—	5	—	1	6	—	2	1	—	3	2	3	—	—	—	1	57	2	3	2	1	6	—	6	
Alcoholism	—	—	—	—	—	—	—	—	—	—	—	—	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Heart Diseases	1	—	—	—	1	1	—	—	1	—	—	1	1	—	2	1	—	1	1	—	—	—	—	8	—	—	1	—	—	—	—	—	
Erysipelas	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Cancer	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	
Cerebro - Spinal Fevers	1	—	1	1	1	1	—	—	—	—	—	—	1	—	1	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	
Remittent and Intermittent Fevers	—	—	1	1	—	—	—	—	—	—	—	—	1	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Typhoid Fever	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	1	—	—	—	—	—	—	—	
Typho - Malarial Fever	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Whooping-Cough	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Smallpox	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Measles	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Scarlet Fever	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Croup	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Diphtheria	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	4	—	—	—	1	—	—	—	—
Other Diseases of St'mach & Bow'ls	—	—	—	—	1	—	—	—	1	—	—	—	—	—	1	—	—	1	—	1	—	—	—	6	—	—	—	—	—	—	1	—	—
Cholera Infantum	—	—	—	—	—	1	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	3	—	—	—	—	—	—	—	—	—
Diarrhoea and Dysentery	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	—	—	—	—	—	3	—	—	—	—	—	—	—	—	—
Congestion of the Lungs	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Acute Bronchitis	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1	2	—	—	—	—	—	—	—	—
Acute Pneumonia	—	1	1	—	1	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	2	—	—	—	—	
Consumption	3	1	—	—	1	3	—	—	2	1	1	2	—	0	1	—	—	2	1	—	1	—	1	1	17	—	—	—	—	—	—	—	—
Total Deaths	8	5	2	1	4	11	5	1	9	4	10	0	8	1	1	10	3	105	3	8	6	0	0	—	3	105	3	3	1	0	—	—	—
Estimated Population	14,000	5,000	1,599	2,000	3,000	10,000	1,500	800	500	2,500	1,500	1,500	8,890	2,500	2,000	8,000	1,200	1,500	10,000	600	7,000	100	1,580	400	2,000	75,000	500	2,000	2,000	3,000	6,000	1,000	10,000
	Alameda	Anaheim and vicinity	Auburn	Azusa and vicinity	Benicia and vicinity	Berkeley	Bishop and vicinity	Carpenteria	Cedarville	Colton and vicinity	Concord and vicinity	Cloverdale	Chico and vicinity	Dixon and vicinity	El Monte and vicinity	Eureka and vicinity	Fallbrook and vicinity	Fort Bidwell and vicinity	Fresno	Fresno Flats	Grass Valley and vicinity	Highlands	Knights Ferry	Kelseyville	Long Beach and vicinity	Los Angeles	Lockeford	Merced	Madera	Monterey	Napa and vicinity	Needles and vicinity	North Temescal and vicinity

ABSTRACT FOR JUNE, 1894—Continued.

Other Causes	23	1	2	7	1	2	—	3	19	3	5	200	21	6	—	—	4	5	3	1	8	—	—	3	2	3	—						
Alcoholism	3	—	—	—	—	—	—	—	—	—	—	2	—	—	—	—	—	1	1	—	—	—	—	—	—	—	7						
Heart Diseases	5	—	—	1	1	—	—	8	1	—	49	1	4	1	—	—	2	1	1	—	3	—	—	—	—	—	86						
Erysipelas	—	—	—	—	—	—	—	—	—	—	1	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	1						
Cancer	6	—	1	1	—	—	—	—	3	—	16	1	1	—	—	—	—	—	—	1	—	—	—	—	—	—	32						
Cerebro - Spinal Fevers	—	—	—	—	—	—	—	—	—	—	7	—	—	—	—	—	1	—	—	—	—	—	—	1	—	—	14						
Remittent and Intermittent Fevers	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3						
Typhoid Fever	1	—	—	—	—	—	—	—	1	—	6	—	—	—	—	—	1	1	—	—	—	—	—	—	—	—	15						
Typho - Malarial Fever	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—						
Whooping-Cough	4	—	—	—	—	—	—	—	—	—	1	—	4	—	—	—	—	—	—	—	—	—	—	—	—	—	9						
Smallpox	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0						
Measles	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1						
Scarlet Fever	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2						
Croup	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1						
Diphtheria	—	—	—	—	—	—	—	—	—	—	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	9						
Other Diseases of St'mach & Bow'ls	—	—	—	—	—	—	—	1	—	—	30	—	3	—	—	—	1	1	—	—	—	—	—	—	—	—	49						
Cholera Infantum	1	—	—	—	—	—	—	—	1	—	7	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—	16						
Diarrhoea and Dysentery	—	—	—	—	—	—	—	—	—	—	4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	10						
Congestion of the Lungs	—	—	—	—	—	—	2	—	—	—	2	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	5						
Acute Bronchitis	—	—	—	—	—	—	—	—	—	—	18	—	2	—	1	—	—	—	—	—	—	—	—	—	—	—	28						
Acute Pneumonia	4	—	—	1	—	—	4	4	1	—	29	1	—	—	—	—	—	1	—	—	—	—	—	1	—	—	53						
Consumption	6	—	—	—	5	4	—	7	4	—	66	8	—	1	—	—	—	—	—	—	—	—	—	—	—	—	148						
Total Deaths	56	1	3	8	9	4	3	41	10	3	11	46	8	2	—	—	0	10	10	10	10	10	10	10	10	10	827						
Estimated Population	60,000	2,000	2,500	9,500	12,000	5,000	3,600	1,800	30,000	41	8,000	18,000	11	22	330,000	18,027	4,000	3,800	1,000	10,000	5,849	5,216	1,200	2	17,000	2,500	1,300	4,000	300	6,000	3,000	3,500	796,881
	Oakland	Oroville	Ontario and vicinity	Pasadena and vicinity	Petaluma and vicinity	Pomona and vicinity	Redlands and vicinity	Rio Vista and vicinity	Sacramento	San Bernardino	San Diego	San Francisco	San José	San Luis Obispo	San Rafael	Santa Maria	Santa Ana and vicinity	Santa Barbara	Santa Rosa	Sausalito	Stockton	St. Helena and vicinity	Truckee and vicinity	Tulare City	Upper Lake	Vallejo	Watsonville and vicinity	Woodland	Totals				

SECRETARY'S REPORT.

To the State Board of Health:

GENTLEMEN: The foregoing reprint of the monthly circulars issued by the Board during the period for which this report is made, is not published as an exact statement of mortality records. The circular is made up from municipal and voluntary reports of physicians throughout the State. A more accurate statement is herewith subjoined in a table made up from reports of County Recorders, according to law. To these have been added the very accurate and complete reports of the San Francisco Board of Health. Some counties have ignored the law of registration altogether; others state that the fault lies with medical men who do not make reports.

The law with reference to the registration of births and marriages is almost entirely ignored. The enforcement of the law appears to rest with the District Attorneys and the Boards of Supervisors. A simple expedient would settle the question for all time. Let Boards of Supervisors appoint an attorney in each county to look up and prosecute delinquent persons, whether physicians and midwives who neglect to register births and deaths, or clergymen and justices who neglect to register marriages; and allow as a fee, one half of the \$50 imposed by law as penalty for neglect or refusal to make such registration.

Judging by the results already obtained, I may consistently promise that the next biennial report of vital statistics will reach practicable exactness. The collection of such statistics from a population estimated at about 1,250,000, settled over an area of territory three times the size of the New England States put together, is a matter of no little labor. Then, considering the distance that reports have to traverse by stage and rail, the slight difference between the percentage of deaths as shown in the hastily improvised monthly circular and by the deliberately collected figures shown in the tables, is in a measure accounted for.

MORTUARY STATISTICS.

[For the fiscal year from June 30, 1892, to June 30, 1893.]

The total number of deaths from all causes for the year was 13,166. Estimating the population of California to be 1,250,000, makes the death-rate 10.53 per thousand of the population.

Smallpox.—There were 8 deaths from smallpox before the epidemic located at two principal points was stamped out.

Measles.—There were 48 deaths from measles.

Scarlatina.—There were 178 deaths from scarlatina, showing an increase of 75 over 1889 and 1890, and an increase of 137 over the preceding year.

Diphtheria.—There were 192 deaths from diphtheria, and 86 from croup. Classing these two diseases as identical, makes a total of 278 due to diphtheria and croup. This is a marvelous reduction from the

death-rate of diphtheria for the two preceding years. During the fiscal year from June 30, 1890, to June 30, 1891, there were 538 deaths due to diphtheria and croup; and during the fiscal year from June 30, 1891, to June 30, 1892, there were 669 deaths due to diphtheria and croup. Inasmuch as a greater increase in fatalities from an infectious disease invariably suggests inquiries into the cause of such increase, so great a reduction in mortality from this frightful disease justifies an inquiry. It will be remembered that the threatened invasion of cholera from Europe was in the early part of 1892. The State Board of Health at that time took a decided stand in favor of personal and municipal cleanliness, urging against a dependence upon maritime and land quarantine alone; claiming that while there could be maintained a practical quarantine by sea, that an effectual land quarantine, which must necessarily be relative, could at no time be deemed sufficient; that the only thing that could with certainty successfully resist the invasion, if it once effected a landing, was the removal of all filth, both private and municipal; in other words, the doctrine of personal and public purity was advocated, and to follow out these views to their practical application we have a logical result in a reduction in the death-rate from all filth diseases. The most notable reduction in the death-rate from diphtheria is in San Francisco and the larger cities of the State. It would seem, therefore, that the expense of a general cleaning-up during the last two years, while our people were being operated on by fears of an invasion from cholera, has not been thrown away. In addition to the security obtained from the foreign pestilence, we have saved many scores of lives in the lessened death-rates from diphtheria, scarlatina, and typhoid fever.

Influenza (La Grippe).—La grippe is credited with 50 deaths during the year, the fatalities being confined almost entirely to the winter months. The year preceding there were 223 deaths from the same cause, and 50 the year before that.

Whooping-Cough.—Whooping-cough caused 25 deaths during the year, as against 94 the year previous, at which time la grippe prevailed quite extensively.

Typhoid Fever.—There were 322 deaths due to typhoid fever.

Cerebro-Spinal Fever.—Cerebro-spinal fever caused 71 deaths during the present year.

Respiratory Diseases.—There were 2,032 deaths from consumption, 979 from pneumonia, 38 from pleurisy, 356 from bronchitis, and 246 from other diseases of the respiratory organs. This would show a total of 3,651 deaths from chronic and acute respiratory diseases during the year.

Alcoholism.—Alcoholism, directly or remotely, is credited with 78 deaths, and this would include also delirium tremens.

[For the fiscal year, from June 30, 1893, to June 30, 1894.]

The total number of deaths from all causes during the year was 11,349, making a death-rate of 9.71 per thousand in an estimated population of 1,250,000.

Smallpox.—There was but 1 death from smallpox during the year; this occurred in Modoc County, in a remote locality in the northeastern portion of the State; at the time of publication it is reported as having been entirely stamped out.

Measles.—There were but 4 deaths reported as being due to measles during the year.

Scarlatina.—Scarlatina is credited with but 23 deaths. It would seem that this disease has also followed the downward pace in the scale of lessened mortality since the general clean-up in anticipation of cholera.

Diphtheria.—There were 155 deaths from diphtheria during the year, which, added to 62 from croup, would make 217. This would show a reduction of 61 from the previous year, and would go far toward showing it to be possible to still further reduce the fatalities from this scourge to a point which would excite little or no fear.

Influenza (La Grippe).—During the year there were 103 deaths attributed to la grippe, the winter, as usual, showing the greatest number of fatalities. There has been little or no deviation from the ordinary course of the disease as observed during the epidemic, which has now lasted for five or six years. Many who had the disease the first winter have since been attacked more than once.

Whooping-Cough.—Whooping-cough is credited with 60 deaths.

Typhoid Fever.—There were 295 deaths, against 322 for the previous year.

Cerebro-Spinal Fever.—There were 57 deaths from cerebro-spinal fever, as against 71 during the previous year.

Respiratory Diseases.—There were 1,789 deaths from consumption, 889 from pneumonia, 31 from pleurisy, 342 from bronchitis, and 221 from other diseases of the respiratory organs. This would show 3,272 deaths from chronic and acute respiratory diseases during the year.

Alcoholism.—Alcoholism, directly or remotely, including delirium tremens, is credited with 65 deaths.

REPORT OF THE STATE BOARD OF HEALTH.

Causes of Deaths.	Sexes.			Ages.								Nativities.					
	Male	Female	Unascertained	Under 1 year	1 and under 5 years	5 and under 10 years	10 and under 20 years	20 and under 30 years	30 and under 40 years	40 and under 50 years	50 and under 60 years	60 and under 100 years	Unascertained	Pacific States	Atlantic States	Foreign Countries	Unascertained
I.—ZYMOTIC OR EPIDEMIC.																	
Cholera infantum	241	134	8	183	44	2	2	1	9	14	16	11	234	2	2	5	8
Diarrhoea and dysentery	192	127	12	90	27	2	3	1	1	1	1	24	115	21	21	48	1
Smallpox	48	25	4	3	1	2	3	1	1	1	1	1	6	3	3	1	1
Measles	178	84	19	2	23	14	19	1	5	3	4	8	41	13	13	12	1
Scarlatina	192	118	73	9	79	58	24	2	5	3	4	8	153	20	20	25	1
Diphtheria	86	54	32	11	42	26	1	1	1	1	1	6	146	7	7	5	4
Croup	50	23	27	22	16	1	1	1	1	1	1	7	77	6	6	5	1
Influenza	25	14	10	1	12	2	2	2	2	2	1	5	17	2	2	5	1
Whooping-cough	21	13	8	3	3	2	2	2	2	1	7	6	6	1	1	11	3
Erysipelas	322	201	111	11	12	28	60	82	50	32	13	25	9	109	79	130	4
Fever—Typhoid	53	27	25	1	7	2	1	8	1	4	3	10	5	27	11	14	1
Remittent and Intermittent	71	41	29	1	25	7	3	6	4	3	3	3	56	7	7	8	1
Cerebro-spinal	78	68	8	2	1	1	1	3	8	15	25	25	8	8	24	43	3
Alcoholism (direct or remote), including delirium tremens																	
II.—CONSTITUTIONAL DISEASES.																	
Tubercular meningitis	58	30	28	20	19	8	4	3	3	1	1	1	44	9	9	5	5
Phthisis pulmonalis	2,032	1,090	403	29	18	22	155	524	532	352	218	156	26	496	598	916	32
Rheumatism	51	30	21	3	1	1	1	8	11	7	6	13	13	13	15	23	2
Cancer	413	219	190	4	1	1	3	9	37	73	121	164	4	28	150	233	2
III.—LOCAL DISEASES.																	
Pneumonia	979	620	357	168	112	28	44	88	95	111	110	213	378	219	367	15	15
Pleurisy	38	27	11	3	2	1	1	5	2	7	6	17	10	1	16	19	2
Bronchitis	356	210	146	110	46	12	3	9	16	44	23	91	2	162	58	134	2
Other diseases of respiratory organs	246	158	86	31	17	7	4	24	32	42	40	67	1	84	57	104	1
Diseases of the liver	204	134	70	12	7	3	1	7	29	41	55	54	2	33	52	117	2
Other diseases of stomach and bowels	1,409	847	549	370	77	41	69	145	166	142	142	282	25	633	323	436	17
Bright's disease and nephritis	379	268	108	13	13	11	13	31	50	69	76	122	2	69	122	184	4
Diseases of the heart	1,051	652	384	15	7	15	42	61	97	147	224	404	33	159	331	543	18

REPORT OF DEATHS FROM JULY, 1883, TO JULY, 1884.

221	141	78	2	139	50	9	5	8	4	105	168	345	8	187	7	14	3
974	612	359	3	104	85	39	19	42	71	241	251	423	129	698	355	531	468
														589			
319	160	152	7										317	2	28	115	171
																	5
219	176	41	2	1			3	85	55	47	45	31	3	30	48	128	13
1														1			
2,062	1,218	829	15	399	66	41	76	162	274	241	251	423	129	698	355	531	468
889																	
13,166	7,524	4,403	650	1,800	864	439	557	1,276	1,550	1,494	1,562	2,780	275	4,941	2,972	4,617	686

Causes of Deaths.	Total.	Sexes.		Ages.										Nativities.				
		Male	Female	Unascertained	Under 1 year	1 and under 5 years	5 and under 10 years	10 and under 20 years	20 and under 30 years	30 and under 40 years	40 and under 50 years	50 and under 60 years	60 and under 100 years	Unascertained	Pacific States	Atlantic States	Foreign Countries	Unascertained
I.—ZYMOTIC OR EPIDEMIC.																		
Cholera morbus	14	11	3	4	12	4	3								7	3	4	
Cholera infantum	130	64	64	113	13	4									130	15	29	
Diarrhoea and dysentery	88	52	33	30	13	1		1	9	8	1				44			
Smallpox	1	1																
Measles	4	16	4	2	16	2	2	1							2	2		
Scarlatina	23	7	7	2	59	48	30	3	1						18	4	1	
Diphtheria	155	79	75	1	34	10									129	23	3	
Croup	62	35	27	18	52	1	10								60	1		
Influenza	103	52	50	2	26	1		2	5	15	14	55			23	47	32	
Whooping-cough	60	28	32	32	2		1	1							59	1		
Erysipelas	37	25	12	9	2	2		2	5	5	3	8			16	6	14	
Fever—Typhoid	295	186	106	3	6	10	20	48	90	52	23	20	1		94	76	121	
Remittent and intermittent	52	35	17	4	9	2	4	2	6	6	3	11	1		22	10	17	
Cerebro-spinal	57	32	25	16	18	7			4	3	3	4			43	9	4	
Alcoholism (direct or remote), including delirium tremens	65	56	9						4	13	16	12	20		5	22	38	

REPORT OF DEATHS FROM JULY, 1893, TO JULY, 1894.

Convulsions	221	141	78	2	139	50	9	5	8	4	105	8	8	107	7	14	3
Other diseases of brain and nervous system	974	612	359	3	104	85	39	19	42	71	106	168	345	264	302	378	10
IV.—DEVELOPMENTAL DISEASES.																	
Old age	319	160	152	7									317	2	115	171	5
V.—EXTERNAL CAUSES.																	
Suicide	219	176	41	2				3	85	55	47	45	31	3	48	128	13
Heat, death from—sunstroke	1																
All other causes not classified	2,062	1,218	829	15	399	66	41	76	162	274	241	251	423	688	355	531	488
Stillbirths	889													589			
Totals	13,166	7,524	4,403	650	1,800	864	489	537	1,276	1,550	1,494	1,552	2,780	4,941	2,972	4,617	686

REPORT OF DEATHS FROM JULY, 1893, TO JULY, 1894—Continued.

Causes of Deaths.	Sexes.		Ages.									Nativities.					
	Male	Female	Unascertained	Under 1 year	1 and under 5 years	5 and under 10 years	10 and under 20 years	20 and under 30 years	30 and under 40 years	40 and under 50 years	50 and under 60 years	60 and under 100 years	Unascertained	Pacific States	Atlantic States	Foreign Countries	Unascertained
Total.																	
II.—CONSTITUTIONAL DISEASES.																	
Tubercular meningitis	75	37	38	18	20	14	3	6	3	1	166	150	1	61	549	6	2
Phthisis pulmonalis	1,789	1,150	638	17	31	9	122	553	479	258	5	130	4	429	790	790	21
Rheumatism	82	36	45	1	1	1	4	6	4	7	5	24	—	6	22	94	—
Cancer	326	156	170	1	—	—	1	6	35	73	97	113	—	15	114	193	4
III.—LOCAL DISEASES.																	
Pneumonia	889	524	364	1	130	20	21	73	94	109	128	209	6	325	225	395	14
Pleurisy	81	23	58	—	—	—	1	4	5	1	6	15	—	4	10	17	—
Bronchitis	842	493	348	3	103	5	4	4	10	36	1	100	3	159	45	138	3
Other diseases of respiratory organs	221	140	81	—	30	4	5	21	22	34	38	57	1	56	57	106	2
Diseases of the liver	138	111	27	—	—	—	—	—	23	34	45	48	—	15	46	93	2
Other diseases of stomach and bowels	738	412	323	3	255	24	29	58	76	68	42	123	8	389	184	194	11
Bright's disease and nephritis	416	268	147	1	2	3	17	15	44	50	74	72	2	65	142	202	7
Diseases of the heart	842	533	307	2	14	3	35	66	74	123	129	281	4	122	273	453	14
Convulsions	166	88	78	2	3	4	2	3	5	3	1	83	—	149	11	6	—
Other diseases of brain and nervous system	996	637	356	3	123	23	23	33	99	92	146	363	6	238	309	382	17
IV.—DEVELOPMENTAL DISEASES.																	
Old age	307	171	135	1	—	—	—	—	—	—	—	307	—	9	117	180	1
V.—EXTERNAL CAUSES.																	
Suicide	230	196	34	—	—	—	6	37	63	50	34	39	1	30	56	137	7
Heat, death from—sunstroke	2	2	—	—	—	—	—	—	1	—	—	—	—	—	1	—	—
All other causes not classified	2,083	1,358	725	9	497	86	87	222	249	292	218	403	20	773	882	676	52
Stillbirths	540	—	—	—	—	—	—	—	—	—	—	—	—	540	—	—	—
Totals	11,349	6,725	4,624	35	1,523	684	269	450	1,252	1,389	1,330	1,229	61	4,097	2,918	4,166	168

REPORTS AND CORRESPONDENCE.

The first report will be the statement of the expenses of the State Board of Health for the forty-fourth and forty-fifth fiscal years, ending June 30, 1894.

The next following is a report by the inspector against smallpox in the northern part of the State. In the early part of the summer of 1892 smallpox prevailed quite extensively among the population around Puget Sound. It became necessary to place an inspector at the northern boundary of the State to guard against its crossing the line from that direction. During the course of the summer of the same year the country was threatened with an invasion of cholera from Europe, and acting under instructions of the State Board of Health, I appointed inspectors to act at Truckee, The Needles, and Yuma, in order to be thoroughly prepared in case it should approach from any of those directions. Before doing so I drafted instructions, based upon the statutes giving the Board authority in such matters; these instructions were submitted to George A. Knight, attorney for the State Board of Health, and by him approved as sufficient; they were also submitted to the General Manager of the Southern Pacific Company, A. N. Towne, who was also satisfied with them. This was done because the railroad companies are so closely interested in epidemics that are likely to be conveyed by their trains. It was therefore deemed advisable to confer with them, so that there might be a coöperation between them and the sanitary officers.

The correspondence between myself and George A. Knight and A. N. Towne is given, also a report made by me to the National Conference of State Boards of Health with reference to the condition of quarantine in California.

It was deemed necessary by the State Board of Health to publish a circular on the restriction and prevention of cholera. A committee was appointed to prepare such a circular, but the circular published by the Connecticut State Board of Health was found to be so well suited for our purpose that, with the consent of the honorable Secretary, Dr. C. A. Lindsley, it was adopted as a whole. The consent of Dr. Lindsley is published with the circular.

There was some controversy between the State Board quarantine officials and the Governor of Arizona Territory with reference to the establishment of a quarantine station at or near Yuma. The Board decided it advisable, in view of the conditions on the desert west of Yuma, to establish the quarantine, if possible, on the Arizona side of the river. The attorney for the State Board of Health advised us that we could do so legally, provided we obtained the consent of the Arizona authorities. To this, however, Governor N. O. Murphy, of Arizona, objected, and it became necessary to stop the trains on the arid desert this side of the river. Some of the correspondence, in the shape of telegrams from General Manager A. N. Towne, is published to show, in a measure, the situation at that time. This is done more with a view to the benefits that may arise in the future than from a mere desire to show what happened at that time. Two committees were appointed to visit the locality. Nevertheless, but little was accomplished. I took occasion the following winter to visit Yuma, in order to satisfy myself by personal observation as to what would be necessary in case of the approach of an

epidemic from that direction. I concluded that while detention of passengers on the barren desert would necessarily be cruel, yet it was on a line the least liable to be traversed by cholera. Unless cholera were to prevail quite extensively throughout the Middle and Southern States, it is quite unlikely to reach California by that route, therefore there will probably be less reason for detention on the desert than elsewhere.

I have caused to be printed in this report a reply to a special committee of the New York Board of Trade and Transportation, relating to quarantine matters in our own country. It is with a feeling of some self-congratulation that I am able to state that Congress enacted into law every recommendation made in that reply.

I have caused to be printed my instructions to Dr. L. A. Elster, whom I appointed special inspector for smallpox at San Luis Obispo and vicinity; also his report relating to his action in the matter.

I have also added a report of tests with tuberculin at the Stockton Insane Asylum, with the clinical histories of the cases and the proving of the tests.

Also a report by special committee of the recent inspection of the Home for the Feeble-Minded at Glen Ellen.

There is also added a report to the Governor by Dr. Ruggles, who was appointed to represent the State of California at the Pan-American Medical Convention that assembled at Washington, D. C., on September 5, 1893.

I have also caused to be published a paper on "Tests for Impurities in Drinking Water," by Dr. Winslow Anderson; and a "Study of Water in Relation to Health and Diseases," by Dr. George M. Kober.

This brief statement is, in my estimation, all that is necessary for me to make with reference to what is herein contained, as a perusal of the reports will more particularly reflect the work that has been done during the past two years. Suffice it to add, that while congratulating ourselves and the people of the State of California that we have escaped an invasion of cholera for two and nearly three succeeding summers, we have also in making ready for the unwelcome guest so purified the plague spots in our cities, towns, and villages, that there has been perceptible a great decrease in the number of deaths from zymotic diseases. The general purification has placed us in a condition to make us contemplate with little or no apprehension the plague now raging in China.

Very respectfully,

J. R. LAINE,
Secretary State Board of Health.

FINANCIAL STATEMENT.

STATEMENT OF THE EXPENSES OF THE STATE BOARD OF HEALTH FOR THE FORTY-FOURTH
FISCAL YEAR, ENDING JUNE 30, 1893.

Appropriation April 6, 1891.....		\$1,500 00
Balance from forty-third fiscal year.....		8 83
1892.		
Aug.—Rent	\$25 00	
Telegrams	1 45	
Traveling expenses, C. A. Ruggles	14 40	
Sept.—Traveling expenses, W. G. Cochran	81 00	
Traveling expenses, J. R. Laine	15 85	
Traveling expenses, C. A. Ruggles	24 90	
Rent	25 00	
Stamps	32 00	
Telegrams and expressage	5 10	
Traveling expenses, C. W. Nutting	14 00	
Oct.—Rent	25 00	
Telegrams	13 76	
Stamps	20 00	
Expressage	2 45	
Traveling expenses, W. G. Cochran	58 50	
Nov.—Traveling expenses, C. A. Ruggles	28 40	
Rent	25 00	
Stamps	20 00	
Telegrams	1 25	
Expressage	85	
Traveling expenses, W. G. Cochran	50 50	
Traveling expenses, C. A. Ruggles	14 40	
Dec.—Rent	25 00	
Stamps	45 00	
Express wagon	1 00	
1893.		
Jan.—Rent	25 00	
Expressage	70	
Stamps	15 00	
Feb.—Rent	25 00	
Subscription "Sanitarian," 1894	4 00	
Telegrams	1 70	
Stamps	15 00	
March—Expenses, W. G. Cochran	56 75	
Traveling expenses, J. R. Laine	26 25	
Traveling expenses, C. A. Ruggles	34 00	
Rent	25 00	
Stamps	120 00	
Telegrams	1 85	
Express wagon	1 00	
Stationery	3 95	
Expressage	35	
April—Rent	25 00	
Telegrams	28 88	
Express wagon	4 25	
Stamps	20 00	
Expenses, C. A. Ruggles	8 90	
May—Traveling expenses, J. R. Laine	48 70	
Rent	25 00	
Stamps	5 00	
Express	75	
Telegrams	85	
Stationery	75	
Traveling expenses, Winslow Anderson	53 20	
Traveling expenses, C. W. Nutting	124 85	
Traveling expenses, W. F. Wiard	48 70	
Traveling expenses, J. H. Davisson	90 85	
Traveling expenses, C. A. Ruggles	62 40	
Traveling expenses, P. C. Remondino	35 29	
Totals	\$1,508 83	\$1,508 83

EXPENDITURES STATE BOARD OF HEALTH, FORTY-FOURTH FISCAL YEAR—APPROPRIATIONS, DEFICIENCIES THAT MAY OCCUR IN STATE DEPARTMENTS.

1893.

June—Balance traveling expenses, P. C. Remondino..... \$42 21

STATEMENT OF THE EXPENSES OF THE STATE BOARD OF HEALTH FOR THE FORTY-FIFTH FISCAL YEAR, ENDING JUNE 30, 1894.

Appropriation March 25, 1893..... \$1,500 00

1893.		
August—	Rent	\$25 00
	Stamps	6 20
Sept.—	Rent	25 00
	Stamps	10 00
	Telegrams	4 74
October—	Rent	25 00
	Stamps	10 00
	Express	5 80
	Telegrams	1 00
	Traveling expenses, W. F. Wiard	27 90
	Traveling expenses, Winslow Anderson	49 54
	Traveling expenses, C. A. Ruggles	44 15
Nov.—	Traveling expenses, Winslow Anderson	17 60
	Rent	25 00
	Stamps	10 00
Dec.—	Rent	25 00
	Postal cards and stamps	15 00
1894.		
Jan.—	Rent	25 00
	Stamps	10 00
	Express	2 40
	Traveling expenses, C. A. Ruggles	12 40
Feb.—	Traveling expenses, C. A. Ruggles	77 65
	Rent	25 00
	Expressage	1 06
	Telegrams	65
	Stamps	10 00
	Rubber bands	1 50
	"Sanitarian," 1894	4 00
March—	Traveling expenses, J. R. Laine	8 35
	Rent	25 00
	Stamps	15 00
	Expressage	30
	Postage and traveling expenses, C. A. Ruggles	10 65
April—	Rent	25 00
	Stamps and postal cards	17 50
	Expressage	8 10
	Telegrams	50
	Ink	1 00
	"Sanitarian," January to December, 1894	4 00
	D. Van Nostrand Co., sewerage	6 00
May—	Traveling expenses, etc., J. R. Laine	69 40
	Traveling expenses, J. H. Davisson	26 60
	Traveling expenses, W. F. Wiard	29 10
	Traveling expenses, C. A. Ruggles	41 50
June—	Rent	25 00
	Stamps	10 00
	Repairing typewriter	1 25
	Express	25
	Telegraph Mill, case for registers	19 00
	D. Van Nostrand Co., sewerage	6 00
	Traveling expenses, C. W. Nutting	38 10
	Traveling expenses, etc., J. R. Laine	41 35
	Traveling expenses, C. A. Ruggles	39 00
	Traveling expenses, J. H. Davisson	77 90
	Traveling expenses, W. F. Wiard	35 40
	Traveling expenses, C. A. Ruggles	17 80

June 30—	Total	\$1,086 63	
	By balance	404 37	
	Totals	\$1,500 00	\$1,500 00

EXPENSES OF THE STATE BOARD OF HEALTH ON ACCOUNT OF CONTAGIOUS AND INFECTIOUS DISEASES FOR FORTY-FOURTH AND FORTY-FIFTH FISCAL YEARS.

1892.		
July 1—Unexpended balance in appropriation.....		\$5,732 45
Appropriation March 23, 1893.....		50,000 00
A. H. Smith, vaccine.....	\$20 00	
Sept.—Services and traveling expenses, C. A. Ruggles.....	444 55	
Oct.—Assessment National Board of Conference.....	10 00	
Neville & Co., tents.....	532 40	
Nov.—Salary, clerk to Secretary, R. M. Ingle.....	60 00	
Expenses, W. G. Cochran and H. Nadeau.....	21 50	
Traveling expenses, C. A. Ruggles.....	250 24	
Expenses, P. G. Cotter.....	374 28	
Assistant Executive Committee National Conference.....	30 00	
S. P. R. R. Co., special train, Yuma to Ogilby.....	154 78	
1893.		
Jan.—Expenses, Jas. P. Booth.....	90 35	
Expenses, W. G. Cochran.....	54 50	
Feb.—A. H. Smith & Co., vaccine.....	10 00	
March—Traveling expenses, C. A. Ruggles.....	253 40	
Services and traveling expenses, L. A. Elster.....	324 00	
Apr.—Traveling expenses, J. R. Laine.....	78 25	
Services and traveling expenses, L. A. Elster.....	299 30	
Services and traveling expenses, C. A. Ruggles.....	120 25	
May—Expenses, P. C. Remondino.....	47 25	
Traveling expenses, C. A. Ruggles.....	21 40	
Reporting and transcribing, G. W. Smith.....	38 00	
Rent of hall, gas, etc., Sanitary Convention, S. F.....	31 75	
June—Salary and traveling expenses, L. A. Elster.....	292 60	
Services and traveling expenses, L. A. Elster.....	162 00	
Total expenditures forty-fourth fiscal year.....	\$3,720 86	
1893.		
July—Traveling expenses, M. F. Price.....	\$15 00	
Traveling expenses, J. H. Davisson.....	34 20	
Traveling expenses, etc., C. A. Ruggles.....	146 54	
Printing pamphlets, Sanitary Convention.....	242 70	
Printing programmes, Sanitary Convention.....	5 00	
Services, L. A. Elster, assistant to Secretary.....	247 93	
Sept.—Services, L. A. Elster, assistant to Secretary.....	467 35	
Examining property at Yuma, etc.....	6 95	
Oct.—Services and traveling expenses, L. A. Elster.....	77 50	
Nov.—Annual assistant State Board of Health.....	30 00	
A. H. Smith & Co., vaccine.....	2 00	
Traveling expenses, C. A. Ruggles.....	278 15	
Traveling expenses, J. H. Davisson.....	201 25	
Dec.—W. B. Rising, analysis of confectionery.....	10 00	
1894.		
Jan.—Traveling expenses, C. W. Nutting.....	239 10	
Minnie Heapley, typewriting.....	20 00	
H. B. Baker, assistant, National Convention.....	10 00	
Feb.—Express.....	2 35	
Telegrams.....	1 00	
Traveling expenses, J. H. Davisson.....	41 00	
March—Traveling expenses, C. A. Ruggles.....	31 40	
May—Louis Liebes, printing signs.....	4 00	
Traveling expenses, W. F. Viard.....	20 00	
Traveling expenses, J. H. Davisson.....	60 00	
Traveling expenses, J. R. Laine.....	20 00	
Traveling expenses, C. A. Ruggles.....	22 50	
Advertising, Sanitary Convention.....	23 75	
Traveling expenses, W. Anderson.....	26 90	
Traveling expenses, Geo. W. Smith.....	60 00	
June—Traveling expenses, C. W. Nutting.....	35 50	
Total.....	\$6,101 93	
June 30—By balance.....	49,630 52	
Totals.....	\$55,732 45	\$55,732 45

REPORTS AND CORRESPONDENCE.

MEDICAL INSPECTOR'S REPORT—SMALLPOX IN BRITISH COLUMBIA.

During the months of June and July, 1892, various sensational and unverified reports had reached the State Board of Health relating to the prevalence of smallpox in British Columbia, at Victoria and Vancouver, threatening the State of California with invasion over the lines of railroad through Washington and Oregon.

These rumors and reports finally coming with so much authenticity, it was deemed advisable to place a Medical Inspector on the California and Oregon Railroad, to serve in compliance with "An Act to prevent the introduction of contagious diseases into the State of California," approved March, 1883. At a meeting of the Board, held at Sacramento July 26, 1892, I was honored with an appointment as Medical Inspector, and was instructed to take a position on the line of railroad, near the northern boundary of the State, and to rigidly and carefully inspect all immigrants and other passengers coming into the State. I was amply supplied with letters of introduction, and instructions to all employees of railroads by A. N. Towne, Esq., General Manager, securing by that method their hearty coöperation in my sanitary mission. I met the Division Superintendent at Dunsmuir in consultation, who advised me to locate my headquarters at Ashland, Oregon, as the time-table made it much more convenient for me to meet the incoming trains from the north at that point than at any other.

I selected a position for a quarantine hospital at a point near the dividing line between Oregon and California. The place was admirably adapted to that purpose, by having a good water supply, a side-track, and shelter from heat by high elevations on each side. There was such an amount of uncertainty as to how much smallpox there really was, that I deemed it advisable to become familiar with the situation all along the line from California to Victoria, and make all necessary arrangements with health departments, so that I might speedily become acquainted with the daily condition of matters, by establishing telegraphic communication with Portland, Oregon, and Tacoma and Seattle, Washington, to whose Health Officers I am under many obligations for acts of kind courtesy extended to me.

To become acquainted with the exact condition, I concluded to visit Victoria, B. C., where it was stated to me, by the United States authorities at Port Townsend, there existed a very uncertain amount of smallpox. Upon meeting in conference the medical officer of Victoria and the United States Consul and other prominent citizens familiar with the subject, I ascertained that on the day of my visit there were fifty-eight cases of smallpox and many suspects; that only two days previous three new cases had developed, which latter fact, in my judgment, justified a continuance of excluding quarantine established by Port Townsend, Tacoma, and Seattle against British Columbia, and on my return I so reported to them.

It was satisfactorily arranged with the Health Officers at the aforementioned places that the earliest possible knowledge of any suspicious passengers on trains should be telegraphed to me at Ashland, Oregon; and at 10:30 A. M. each day, as the train came from the north, I took passage, and when the State line was passed I made a careful personal examination of every passenger on that train, particularly if they came from either of the above stated places. My examination was completed in time to take the northern-bound train at Hornbrook, California, arriving at Ashland at 4:30 P. M. Fortunately I did not find a case of variola during the six weeks of daily inspection.

Being well supplied with Martin's bovine virus, I vaccinated all railroad employes, and all others who wished it, free of charge.

From information received from Health Officers at Tacoma, Seattle, and Port Townsend, and from United States Consul Myers, at Victoria, B. C., I was satisfied that the disease at that point was under control, and reported to Dr. Laine, Secretary of the State Board of Health, that I did not deem it necessary for me to remain on duty any longer, consequently I was relieved.

C. A. RUGGLES, M.D.,
Medical Inspector.

Mr. — — —:

DEAR SIR: You are hereby appointed Medical Inspector for the California State Board of Health, to serve in compliance with an Act to prevent the introduction of contagious diseases into California, approved March 16, 1883, which Act is hereby made a part of your instructions, and reads as follows:

SECTION 1. Whenever there shall exist, in the opinion of the State Board of Health, imminent danger of the introduction of contagious or infectious diseases into the State of California, by means of railroad communication with other States, the said State Board of Health are authorized, and it is hereby made their duty, to make, or cause to be made, by an accredited officer or inspector, an inspection of all railroad cars coming into the State at such point, or between such points, within the State limits as may be selected for the purpose.

SEC. 2. Such inspection shall be made, where practicable, during the ordinary detention of a train at a station, or while in transit between stations, and in all cases shall be so conducted as to occasion the least possible detention or interruption of travel, or inconvenience to the railroad companies, so far as consistent with the purpose of this Act.

SEC. 3. Should the discovery be made of the existence among the passengers of any dangerous, contagious, or infectious disease, the said Board of Health, or their agent or inspector, under rules and conditions prescribed by them as being applicable to the nature of the disease, shall have power to cause the side-tracking or detention of any car or cars so infected, to isolate the sick, or to remove them to a suitable place for treatment, to establish a suitable refuge station, to cause the passengers and materials in such infected car to be subjected to disinfection and cleansing before proceeding farther into the State, and, in case of smallpox, to offer free vaccination to all persons exposed in any car or at any station.

You are hereby directed to take a position on the line of the railroad, and to inspect all immigrants and other passengers coming into the State.

You will place yourself in communication with the Sheriff of the county where you are stationed, and demand from him the necessary number of deputies to enforce the provisions of these instructions, and to detain passengers held at the quarantine or refuge station as long as the public safety demands.

You are to establish daily telegraph communication with the Health Officials of ———, so as to ascertain if there are suspicious cases of disease on the trains destined for the interior. Should you discover

cholera on any train, you will cause the car in which it is found to be side-tracked, and the passengers quarantined and kept in a place suitable for the sick, and convenient to the railroad companies.

You will cause the car in which cholera was discovered to be cleansed and moistened on the interior by sprinkling with a solution of bi-chloride of mercury, when all clothes and personal effects of passengers that have been exposed to the disease are to be opened, hung up, or spread on the seats, and thoroughly fumigated with sulphur.

The fumigation is to be performed in the following manner: Place a kettle of water on the car stove and get it to boiling, for it is necessary that there should be steam, or the fumigation will be of little benefit. Then place an iron pan containing from four to eight pounds of sulphur, moistened with alcohol, supported by two bricks or stones, over a few inches of water in a tub. Let the windows and doors be tightly closed, the sulphur ignited, and the fumigating process maintained twelve hours. Let the doors then be opened and the car ventilated, when it may be considered safe to enter.

All persons who have been in any way exposed to the infection must be compelled to bathe and have their clothes fumigated before being allowed to proceed.

All cases of suspicious diseases of a diarrhœic character are to be detained until the nature of their ailment shall have been fully determined by you. You will detain all persons sick with cholera in a hospital camp to be selected for the purpose, where you will supply them with necessary food, care, and medical attendance.

You will keep the Secretary of the State Board of Health daily advised concerning your needs and requirements in carrying out these instructions.

You will keep a record of all the cases of cholera discovered, cars quarantined and fumigated, and all proceedings under the duties assigned you, and report them to the Secretary of the State Board of Health, every day while you are on duty.

You are to conduct the necessary precautions to be taken in such a manner as to put passengers and the railroad companies to the least possible inconvenience. While you are expected to be energetic and vigilant, you will avoid all arbitrary exhibition of authority.

In the performance of your duties, much is left to your discretion and good judgment; but you are charged by the State Board of Health not to exceed the authority vested in the Board by the Act which appears on these instructions, and under which they are given.

It is believed that you will exercise your powers with prudence, dignity, and courtesy.

By order of the State Board of Health.

OFFICE CALIFORNIA STATE BOARD OF HEALTH, }
SACRAMENTO, September 10, 1892. }

GEO. A. KNIGHT, *Att'y for the State Board of Health, San Francisco, Cal.:*

DEAR SIR: Agreeable to instructions of the State Board of Health, I transmit herewith a draft of instructions for the inspectors we contemplate placing on the State borders to exclude the epidemic of cholera now threatening the State.

Before adopting them, I desire to ask your opinion concerning the following points:

(1) Do these instructions to inspectors exceed the powers of the Board under the laws of California?

(2) Is there anything in the laws of the State authorizing the Board to use force in holding the people taken off an infected train in quarantine at refuge stations and camps?

(3) Have the Board of Health authority to exclude or turn back infected cars and prevent them from entering the State of California?

(4) What means can the State Board of Health employ under the general police power of the State in addition to the Act under which these instructions are made?

(5) What means may be employed by the State to prevent the people quarantined from escaping and scattering the infection throughout the State?

(6) Upon whom will devolve the expense for subsistence when passengers are detained at a refuge or land quarantine station?

I will await your reply with considerable impatience, as it is the wish of the Board that every preliminary step should be taken at the earliest possible date; and as the efficiency of land quarantine must depend largely upon the specific instructions given our inspectors, it is necessary that they should be supported by the laws of the State in every particular; and it is essential that the sanitary authorities should do all that the law will permit them to do to prevent cholera from effecting a lodgment among us.

Very respectfully yours,

J. R. LAINE, M.D.,
Secretary State Board of Health.

LAW DEPARTMENT OF THE
STATE AND SAN FRANCISCO BOARDS OF HEALTH, }
SAN FRANCISCO, September 13, 1892.

J. R. LAINE, M.D., *Secretary State Board of Health, Sacramento, Cal.:*

DEAR SIR: Replying to your inquiries contained in your letter of date September 10, 1892, I beg to say:

(1) That your instructions to inspectors, of which you inclosed me a copy, are not in excess of the powers of Boards of Health, the State Board acting with the local health authorities, where there are such local health authorities, in emergencies of this character.

(2) It is within the power, and is the duty, of the Health Department of the State, coöperating with the local authorities, to use all force reasonably necessary in holding people ordered into quarantine, to be kept and detained there until discharged.

(3) The health authorities have undoubted power, and it is their duty, to turn back infected cars, and prevent infected cars, persons, and property from entering the State of California.

(4) Under the general police power of the State, the health authorities are vested with, and may employ, any means reasonably necessary in their judgment to effect the preventing of infectious or contagious disease from entering or coming within the State, by excluding all

infected persons and property from this State, preventing such persons or property coming into the State, and if any such persons or property are found within the State, then by quarantining them so long as reasonably necessary to prevent them spreading disease, and by disinfecting or destroying, as in the judgment of the health authorities is necessary, any infected property—the object in view being to keep out of the State all such contagion, and remove any that may have obtained a foothold in the State.

(5) I think the health authorities should place themselves in communication with the Sheriffs of the various counties, at such points as it is apprehended contagion may enter the State, and, coöperating with such Sheriffs, prevent any persons or property entering the State having infection among them, or in the property, and quarantining and keeping in quarantine so long as necessary all persons coming into the State from places reasonably apprehended to be infected, and either destroying or fumigating to such extent as necessary all property coming from any such infected place. All force necessary to effect these objects may be employed.

(6) I know of no means whereby money can be had by the health authorities, from any present existing fund, for these purposes, except the special fund of each department of health, and as these special funds are usually so small as not to be requisite to meet enlarged expenses of the kind in question, I believe that recourse will necessarily have to be had to the next Legislature to meet the expenses which may be incurred in keeping out contagion, by a special bill appropriating such amount as shall be necessary to liquidate the same. I believe that the transportation companies may be properly called upon to pay the expenses of fumigating vehicles of transportation, and all property brought by them into the State which, in the judgment of the health authorities, should be fumigated, including the property of passengers and their clothing and personal effects. But I do not believe that anybody can be made to stand the expenses of maintaining the quarantine stations, and the necessities of life for persons quarantined, but that relief must be had from the Legislature to meet any expenses which may be incurred, by way of a deficiency or relief bill.

Very respectfully,

GEO. A. KNIGHT,
Attorney for State Board of Health.

OFFICE CALIFORNIA STATE BOARD OF HEALTH, }
SACRAMENTO, September 10, 1892. }

A. N. TOWNE, *San Francisco, Cal.:*

DEAR SIR: Agreeable to instructions of the State Board of Health, I transmit herewith a draft of instructions to inspectors, which the Board contemplates placing at the State borders in case of danger of infection of the State by the epidemic cholera now raging in Europe.

These instructions will be modified to meet the reply of the attorney of the Board, Geo. A. Knight, to the interrogatories therein contained, a copy of which is also inclosed.

I would be glad if you would give me the benefit of your experience

in such matters, with such suggestions relating to modifications of these instructions as would conduce to the comfort of the passengers on the trains, and to the convenience of the railroad authorities.

Before the final adoption of a circular of instructions to inspectors, I would like to meet you to consult verbally with reference to these matters in a more extended manner than can be done by letter.

Yours very respectfully,

J. R. LAINE, M.D.,
Secretary State Board of Health.

SOUTHERN PACIFIC COMPANY, OFFICE OF THE
SECOND VICE-PRESIDENT AND GENERAL MANAGER, }
SAN FRANCISCO, CAL., September 12, 1892.

J. R. LAINE, Esq., M.D., *Secretary State Board of Health, 913 K Street, Sacramento:*

DEAR SIR: I am just in receipt of yours of the 10th instant, with inclosures, all of which I have read with care. It would seem to me that your general circular of instructions and your inquiry of Attorney Knight, pretty completely covers the ground.

As soon as you shall have received a reply from the latter gentleman, I would be very thankful for a copy of the same, and when it may be your convenience to call, it will afford me pleasure to see you and discuss the subject-matter of so much importance to our west coast, when possibly I may be able to make some suggestions that may be useful to you, when you are prepared to quarantine our three different ports of entry to the State by rail.

If there is anything we can do to aid you in the work you have outlined, please consider that we are at your service.

Yours truly,

A. N. TOWNE.

SOUTHERN PACIFIC COMPANY, OFFICE OF THE
SECOND VICE-PRESIDENT AND GENERAL MANAGER, }
SAN FRANCISCO, CAL., September 20, 1892.

Dr. J. R. LAINE, *Secretary State Board of Health, Sacramento:*

MY DEAR DOCTOR: On my return to the office, I find your letter of the 15th instant, also copy of Attorney Knight's opinion in relation to quarantine requirements.

I suppose I need not reassure you that our people are in full accord with you and the other members of the State Board of Health in your efforts to keep out the cholera, or, in fact, any epidemic that may threaten us. As I told you yesterday, I telegraphed to our agent at Yuma asking if Government buildings on the west bank of the Colorado River might not be utilized to your advantage, but learn that the buildings in question are occupied by the Government as schools for Indians; therefore, they could not be had.

As for cars, of course we will furnish them when required, but permit

me to suggest that during winter and summer it is usually so warm at Yuma as to make it more comfortable in tents, which I presume you would have no trouble in pitching, say a little out of Yuma; but should you require cars at this point, as you may at others, where it is colder, we would probably put in a spur track somewhere accessible to water. Fuel and provisions would, of course, have to be carried to the cars. Probably cars would be required this side of Reno, but up toward Ashland, the climate is milder. It is a question, however, whether you would quarantine on Oregon territory, unless you come down to the foot of the Siskiyou range, at some convenient point near water.

In this connection, do you not think it would be desirable to make the inspectors at these several entrances joint inspectors for California and the adjoining State or Territory, as the case may be? Such an arrangement might render your work more effective, and no doubt it could be made with the respective Governors.

However, as soon as you are ready and can indicate definite localities, we will, on your request, provide an emigrant car, containing bunks and stoves; also a freight car, where cooking may be done. Of course, you would be expected to furnish blankets and bedding; also necessary culinary articles, fuel, provisions, etc.

Probably it would meet your ideas to have your inspectors in close touch with our Division Superintendents in the localities referred to, and possibly the inspectors and the Superintendents, being on the ground, would be better able to fix upon particular localities for this work than either you or I. As I suggested yesterday, perhaps we could handle this epidemic as we have done during the smallpox scourge, or rather when isolated cases have been discovered, viz.: switch out the car with its passengers, as soon as the case was discovered, but permitting the remainder of the cars to go on to their destination; it might be claimed that the whole train should be quarantined, but from my talk with you yesterday, I am inclined to think you will look upon this matter purely from a thoroughly practical and reasonable standpoint; therefore, I would ask you to carefully consider what we have done in the past in relation to these things.

Remember, that in all these things we wish to work in harmony with you, and hope that you will feel free to communicate with us on all subjects at any and all times.

Yours truly,

A. N. TOWNE.

SOUTHERN PACIFIC COMPANY, OFFICE OF THE
SECOND VICE-PRESIDENT AND GENERAL MANAGER, {
SAN FRANCISCO, September 23, 1892.

Dr. J. R. LAINE, Secretary State Board of Health, Sacramento:

DEAR SIR: Many thanks for yours of the 22d instant and for the suggestion contained therein. I gave directions to have this matter attended to a few days ago, and will at once issue proper notice, if it has not already been done.

Hereunder I quote copies of two telegrams, from which it would seem that it would surely be the part of wisdom to adopt my suggestion of the other day—that is, either to have joint inspectors, or have a joint and

concerted action between the inspectors of California and the adjoining States and Territories:

LOS ANGELES, September 22, 1892.

To R. H. PRATT, *San Francisco*:

Dr. Cotter, California State Health Officer, cut smoker C. P. 1040 out of No. 20 at Ogilby to-day, occupied by fifteen passengers, on account of George B. Pope, one of the passengers, having bowel complaint, and W. H. Clark, a passenger from Gainsville, Texas, where dispatches say two deaths and four cases of cholera have occurred. The doctor asks us to send food for fifteen passengers and two deputies for twenty-four hours. Will the company furnish food?

(Signed)

J. A. MUIR,
Superintendent.

SAN FRANCISCO, September 22, 1892.

J. A. MUIR, *Los Angeles*:

Send an emigrant car and a car of water to Ogilby; also, provisions as requested by the doctor, and suggest to him that he confine the sick to the car they are now in, putting the others into the car you send. If you have no emigrant car at Los Angeles, will send you one from Tucson. Keep them supplied with ice. How soon can you get water car there? Answer.

(Signed)

R. H. PRATT.

To us it looks like a mistake to set this car out this side of Yuma, at a place where there is no water, or anything else to provide for these people. We hardly think the doctor had fully made up his mind what to do until he had left Yuma; for this reason, it would seem to be best to have a joint coöperation with the authorities of Arizona, New Mexico, and Nevada, in order that there might be an inspector on incoming trains, enabling the inspectors to locate suspicious cases before reaching the State line; especially would this seem to be desirable on the southern line, as Yuma would be the best place for the passengers, rather than to take them out on the desert, where the road runs for a long distance below sea-level; in fact, as far as 269 feet below at one point, and where the temperature is extremely oppressive. Such surroundings certainly cannot be conducive to recuperation of sick people.

A telegram just comes to hand that Dr. Cotter has released the car with its occupants, and permitted them to continue their journey. It would seem that he was a trifle hasty in this matter, and I do hope he will not subject passengers to any further unnecessary delay, for the reason that it will surely do the State very much harm, if reports are circulated that travelers are likely to be quarantined on the desert, if they should develop some slight affection of the stomach or bowels.

Yours truly,

A. N. TOWNE.

SOUTHERN PACIFIC COMPANY, OFFICE OF THE
SECOND VICE-PRESIDENT AND GENERAL MANAGER, }
SAN FRANCISCO, CAL., October 10, 1892.

J. R. LAINE, *Esq.*, *Secretary State Board of Health, Sacramento*:

DEAR SIR: Thanks for yours of the 5th instant. Our Superintendent at Los Angeles informs us that Dr. Cotter sent direct to you the bills for meals furnished quarantined passengers at Ogilby station, near Yuma, ordered through our people. In addition to this there was incurred the expense of three special trains from Yuma to Ogilby and return, on the 22d, 29th, and 30th of September. The cost of running trains on that division, owing to its isolation, great distance from fuel, supplies, etc.,

is greater than the average of our entire system; still, under the circumstances, I think it will be about right for us to base our charge for the service on the average cost, the accompanying bill being made on this basis. The charge for water and ice hauled out on the desert is taken from our regular rate sheets.

Trusting this will meet with your approval, I am
Yours truly,

A. N. TOWNE.

SOUTHERN PACIFIC COMPANY, OFFICE OF THE
SECOND VICE-PRESIDENT AND GENERAL MANAGER, }
SAN FRANCISCO, CAL., November 26, 1892.

Dr. J. R. LAINE, Secretary State Board of Health, Sacramento, Cal.:

DEAR SIR: Many thanks for yours of the 25th instant, inclosing check for \$154 50, drawn in my favor, for extra train, ice, etc., used near Yuma for account of the State Board of Health.

Yours truly,

A. N. TOWNE.

PHOENIX, ARIZONA, September 28, 1892.

Dr. P. G. COTTER, Medical Inspector California State Board of Health, Yuma, Arizona:

DEAR SIR: In reply to your letter and telegram from the State Board of Health of California (returned herewith) I have to say: That the authorities of Arizona do not consider it proper to permit the medical officers of California to establish a quarantine station in Arizona. While it is my desire to extend every courtesy compatible with propriety and a due regard for the interests of the citizens of the Territory, it would hardly seem proper and right, after travelers have crossed the entire Territory, to quarantine them on our frontier as they are passing out.

Under your jurisdiction you can detain suspects and diseased persons after they have crossed the river, and a wide stretch of uninhabited country lies between your station and populous parts of your State.

Yours respectfully,

N. O. MURPHY,
Governor.

LAW DEPARTMENT OF THE
STATE AND SAN FRANCISCO BOARDS OF HEALTH, }
SAN FRANCISCO, September 26, 1892.

Dr. J. R. LAINE, Secretary State Board of Health, Sacramento:

DEAR SIR: Yours of the 24th at hand. You ask if your honorable Board can spend the public money in taking care of suspects if, in the judgment of the State Board, it is better for the State's safety to locate them and their camps and camp equipage on the other side of the Colorado River.

I will state to your honorable Board that the object of quarantine and expenditure of public money being to protect our citizens from the epidemic, the Board of Health is invested with a large discretion in all these matters, and I see no objection to the Board using the money in any way that will protect our citizens. The only objection that could be urged is from the authorities in Arizona. If no complaint is made from that quarter, I unhesitatingly say that the money having been used for purposes of quarantine, *where* it was used cuts but little figure.

Respectfully,

GEO. A. KNIGHT,
Attorney for State Board of Health.

NATIONAL CONFERENCE OF STATE BOARDS OF HEALTH,
SECRETARY'S OFFICE,
COLUMBUS, OHIO, August 27, 1892. }

Dr. J. R. LAINE, Secretary of State Board of Health, Sacramento, Cal.:

DEAR SIR: I have the honor to inform you that, at a meeting of the Executive Committee of the National Conference of State Boards of Health, held in Indianapolis August 26th, you were appointed a member of the Quarantine Inspection Commission, created by the committee. The other members of the Commission are: Dr. Baker, of Michigan; Dr. McCormack, of Kentucky; Dr. Watson, of New Hampshire; either Dr. Saloman or Dr. Holt, of Louisiana; Dr. Bryce, of Ontario, and Dr. Orvananos, of Mexico.

You are respectfully requested to make an inspection of all quarantine stations of the Pacific Coast, to note their equipment and efficiency of administration, and to report at the earliest possible date to Dr. McCormack, President of the Conference of State Boards of Health. It is suggested that a preliminary report is desirable soon, a complete report to be made at your convenience.

Expenses of the Commission will be refunded by the Conference.

Yours truly,

C. O. PROBST,
Secretary.

OFFICE CALIFORNIA STATE BOARD OF HEALTH, }
SACRAMENTO, September 12, 1892. }

Dr. J. H. McCORMACK, President Conference State Boards of Health, Bowling Green, Ky.:

DEAR SIR: In compliance with a request intimated to me by Secretary C. O. Probst, of recent date, informing me that I am expected to make an inspection of the quarantine stations on the Pacific Coast, I wish to make a preliminary report.

San Francisco Quarantine Station.—I visited the quarantine station on Angel Island, in San Francisco harbor, and find that it is equipped not only with the necessary buildings for officers and nurses, but that it has a water supply ample in quantity and excellent in quality. It has also a lazaretto for the accommodation of the sick, and barracks with tiers

of bunks sufficient for the accommodation of from five hundred to eight hundred Chinese or Japanese. The situation is in a natural cove on the northeast side of the island, well protected from the winds and admirably situated every way for the purpose for which it is intended. The disinfection apparatus is an improved Holt's, composed of three cylinders, each 40 feet long and 8 feet in diameter, supported by cast-iron saddles. The clothing and other effects are hung up by hooks inside, when heat and steam and sulphurous fumes are introduced. I was informed by the resident surgeon, Dr. Carmichael, that it is intended to build a hospital for non-contagious diseases, and also additional barracks. There is sufficient ground for a camp of several thousand people, if necessary. There is a ship in San Francisco harbor built by the Government for fumigating vessels. If this vessel were put into commission at once, San Francisco harbor might be pronounced by experts as being fully equipped to meet any and all emergencies. The State Board of Health have recently requested the Secretary of the Treasury, by resolution, to place this vessel in commission.

San Diego Quarantine Station.—I am informed by Dr. Carmichael, Resident Surgeon of the San Francisco Quarantine Station, and also by Dr. P. C. Remondino, member of the State Board of Health, from San Diego, that while there is a wharf at the site of the quarantine station at San Diego, and an officer or inspector for the Government in charge, yet there are no buildings or other accommodations for passengers that might be detained in quarantine, nor is there any apparatus or other appliances for the fumigation of their effects.

Port Townsend Quarantine Station.—I am also informed by Dr. Carmichael that the quarantine station at Port Townsend is in the same condition. They have a site and officers in charge, but no buildings and no apparatus for the fumigation of freight, baggage, or personal effects.

In view of these facts, and that ships from infected ports might at any time arrive and touch at these points, it has been deemed advisable by the State Board of Health to telegraph the Secretary of the Treasury to cause these stations to be equipped with approved appliances for disinfection and fumigation purposes. So far no reply has been received from the Secretary of the Treasury.

San Pedro Quarantine Station.—With reference to San Pedro, I append herewith, in full, a note from Dr. R. W. Hill, Contract Surgeon in charge of the Marine Hospital in San Pedro. It is unnecessary to comment further:

Dr. J. R. LAINE, Sacramento:

DEAR DOCTOR: I informed Dr. Cochran last week that I would serve as inspector for the Board, provided cholera should appear. Our city is now in a very good sanitary condition, owing to activity of our local Board in coöperating with myself in compelling cleanliness in all quarters. If you will refer to United States Collectors' statistics, you will see that we have far more shipping here than at any port south of San Francisco. The small coasters trading with Mexico, and Chinese junks, are a constant menace to health of all Southern California, by importing smallpox or other diseases from southern ports into this, the port of entry of Los Angeles. Our quarantine regulations and facilities are at present worthless. We have no pest-house or smallpox hospital. I have tents for use of Government cases only. The State should also have the same.

Yours truly,

R. W. HILL.

In view of the distance of California from the Atlantic seaboard, the attention of our State Board of Health has been directed mainly toward the matter of land quarantine and refuge stations at the points where

the railroads enter the State, because it seems as if cholera would be more likely to reach us by rail than by sea, unless it would first reach British Columbia by rail and then come down by vessel from Puget Sound; or first reach South America, Panama, or Mexico, and then come north by vessel to our ports.

The difficulties involved in making anything like an effectual land quarantine on our borders are enormous. An absolute quarantine, preventing all living things or matter from crossing our borders, or infected water from flowing down into our territory, must be put aside as impracticable. A relative quarantine—the inspection of passengers in transit; the detention of the sick in quarantine camps; the quarantining, for a limited period, of those who have been exposed to the disease; the fumigation of cars, clothing, and personal effects of those who have been exposed to cholera on a train—is at this time believed to be all that is practicable to do.

Our ability to detain passengers who have been exposed to the disease, at the refuge stations in a sparsely settled mountainous country, is viewed with some doubt, as without military guards around the camps there will be nothing to prevent them from scattering through the country.

We will, however, adopt such measures as we find available when the emergency arises.

It is my purpose to visit the quarantine stations at San Diego and Port Townsend at an early date, when I will report fully concerning them.

If you can offer further suggestions relative to an effectual land quarantine, I would be very glad to have you do so.

Yours very respectfully,

J. R. LAINE,
Secretary State Board of Health.

CONNECTICUT STATE BOARD OF HEALTH,
SECRETARY'S OFFICE,
NEW HAVEN, CT., September 15, 1892. }

J. R. LAINE, *Secretary California State Board of Health:*

DEAR DOCTOR: I shall feel highly honored to have you use the circular on cholera in the way you propose.

Very respectfully,

C. A. LINDSLEY,
Secretary.

The circular is as follows:

RESTRICTION AND PREVENTION OF CHOLERA.

[Circular No. 4 of the Preventive Disease Series of the State Board of Health.]

So long as cholera continues to spread over Europe, in spite of the persistent efforts to arrest its progress, the United States cannot feel exempt from the danger of its introduction.

Ordinary prudence dictates the propriety of taking such precautions as will reduce the chances of its invasion to the minimum, or, failing to prevent its invasion, to adopt such measures in advance of its approach as will to the utmost restrict its spread.

To prevent its admission among our people, will depend chiefly upon the vigilance and intelligent activity of health officials at the ports of entry.

To restrict its spread after the disease has gained a lodgment, will depend upon the people and upon the local Boards of Health.

In view of the present situation, the people of California and the Health Officers of towns cannot be too prompt and energetic in taking such measures as are best calculated to resist this dreaded foe. While it is possible that a visitation of cholera may be escaped this year, it is the part of wisdom to be prepared. If all reasonable precautions have been taken, the public will be less likely to be seized with that unreasoning fear and panic that predisposes to the disease and is a powerful adjunct to its spread. It is also true that all sanitary improvements are of lasting benefit, and if we now escape this disease, the results of the sanitary work accomplished will be seen in a better state of public health, less sickness, and a lowered death-rate.

The value of action before disease appears is beyond all comparison greater than that taken in the presence of an epidemic. Public safety will be best secured by such preparation as is known to be the most effective, before the approach of the foe. Fortifications cannot be erected while under the fire of the enemy. The sanitary barriers which defend from fatal disease are much the same, whether it be Asiatic cholera or any other infectious malady. The watchword of protection is *cleanliness*. If we make ourselves clean and our surroundings clean, the cholera may come, but it will fail to find an abiding place.

What to do will be best understood by knowing how cholera is communicated.

Cholera is not contagious in the same sense that scarlet fever and smallpox are contagious; it is not what is commonly called "catching." If disinfection and other proper precautions are used, there is scarcely any risk that the disease will spread to those that nurse, or otherwise attend closely upon the sick. It is the present belief of scientists that it is always communicated by a specific infection—a living germ, known as the *comma bacillus*. Every precautionary effort has relation to preventing the propagation of this germ and to its destruction. The disease cannot exist unless the germ exists. Nor can the disease occur unless the germ gains access to the intestinal canal. All measures of prevention are based on these facts.

The evacuations of a cholera patient contain the infecting germ. This is its primary source.

The cholera germ can be reproductive outside the human body under favorable conditions. Vile, filthy, undrained or unsewered tenements, filth-saturated soil from leaky drain-pipes, an atmosphere reeking with the gases of decay, soil polluted with the putrefactive compounds from garbage, kitchen slops, sink-drains, overflowing privy vaults, and the overcrowded haunts of vice and crime, in which misery compels the poor also to seek shelter, furnish in the most inviting form the essential conditions for the re-propagation of the *contagium* of cholera. Less aggravated instances of unsanitary conditions are proportionately dangerous. A warm, moist atmosphere, into which putrefying organic matter is discharging the gases of decay, is favorable to the development of the germs of cholera. The water from wells polluted by filth from closely-adjacent vaults or drains, and other sources of water supply

defiled by sewage, if also infected with the specific contagion of cholera, has long been recognized as one of the most active agents in the spread of this disease.

Dr. Shakespeare, in his recent report to the United States Government on cholera in Europe and India, says that the spread of the disease after its introduction into a locality is "universally associated with contaminated water supply, filthy habits, and bad personal and domestic hygiene." Hence it is one of the "filth diseases."

With such knowledge of the disease the measures of prevention are obviously both general and individual.

The *general* measures should engage the attention of Health Officers, whose duty it should be to enforce the highest standard of public hygiene practicable. A systematic and thorough sanitary survey of all premises within their respective jurisdiction should be made. All nuisances dangerous to the public health should be promptly abated. The milk supply and water supply, those common carriers of infection, should receive their special attention. The markets should be inspected with reference to the quality of food offered for sale. Notice should be taken of every known means by which it would be possible, if a case of cholera should occur in their locality, that the evacuations of the sick containing the infection might reach the intestines of another susceptible person.

In the event of cholera appearing in a town, the Health Officer should provide for its care by isolating the case, with proper attendance, and by taking such action as will insure without any doubt the thorough disinfection of all the excretions of the patient. *This is the one essential thing above all others which he should be sure to have performed.* If the disinfection of all the excrementitious discharges of the patient is thorough there can be no spread of the disease from that case.

Health Officers should also keep under observation all newly arrived immigrants, until such time after their arrival that the incubation period of any infectious disease shall have expired.

The *individual* measures of precaution relate to the conduct of the person. The tendency to infection varies among individuals.

The normal acid juices of the stomach can destroy the infection. But if by any indiscretions of diet or other influence the digestive powers are impaired or enfeebled, and the cholera germ is not destroyed in the stomach but passes on into the duodenum, where there is an alkaline reaction, great multiplication of the germ becomes possible, with elaboration of the poisonous ptomaine and establishment of the disease.

Hence the importance of regular habits of life of careful preservation of good digestive powers. Particularly avoid drinking large quantities of water *between* meals, because between meals a neutral reaction of the gastric juices exists, and the protective effects of *acid* gastric juice against the bacillus is lost.

"Experience has abundantly proved," says Dr. Shakespeare, "that two laws have an important bearing upon the spread of cholera: (1) The tendency to infection varies exceedingly among individuals, and is with the vast majority exceedingly small. (2) Disturbed conditions of the digestive apparatus greatly increase the susceptibility of an individual and render him far more liable to an attack after exposure to the infection."

The personal precautions are few and simple: (1) A plain nutritious

diet. (2) Meals at regular hours. (3) Indulge in no excesses of eating or drinking, especially of alcoholic stimulants or ice water. (4) Never eat without first washing the hands. (5) Avoid high excitement, great fatigue, and taking cold, and keep cheerful.

Persons who are in vigorous health and lead cleanly, regular lives rarely take cholera. Its victims are mostly among the dissipated and the dirty.

Finally, the thorough boiling of milk or water before using it, while cholera is prevailing, is never to be neglected. In the presence of an epidemic, all food should be eaten freshly cooked, because heat kills the infection.

Our control over the spread of cholera is complete, as the laws which govern it are so well understood. Were it not that from neglect and indifference, unsanitary conditions have been, and are, allowed to become so extensive and complicated that they cannot at once be remedied, there would be no reason to fear this scourge. The contagion of cholera can be destroyed, whatever its essential nature may be, and the disinfectants that destroy it are well known and easily used. The factors for an epidemic of cholera are: (1) The specific contagion; (2) Moisture and warmth; (3) Filth.

If the specific contagion be not excluded by quarantine it can be destroyed by disinfection. The filth factors can be removed or purified. While warmth and moisture are essential for the multiplication of the germs, they can be preserved for an indefinite time in a dry state, and again become active if the proper conditions for their development are supplied. The limits of the contaminated area mark the boundary of the spread of cholera. With pure air, pure water, and an uncontaminated soil, an epidemic of cholera could not be developed. The nearer this standard is reached, the less the danger from cholera. Sporadic cases might, indeed, occur by importation of the infection, but the disease would be readily controlled. Cholera is a stern teacher of the importance of public hygiene. It is "the world's great nuisance-searcher, as well as a relentless destroyer, silently invading and smiting the people that have left open the door for such visitation."

The most certain disinfectant is fire. Hence all articles of small or no value should be burned, in the room, if practicable, in the stove, or, better still, in an open fireplace. Fire is infallible.

Articles of value which can be washed, such as bedding, soiled underclothing, etc., should, immediately they are not needed for use, be immersed in a disinfectant solution for four hours, after which they may be subjected to the usual processes of the laundry, namely, boiling, washing, airing, ironing. Garments of wool or silk, which would be injured by wetting, can be disinfected by exposure to dry heat at a temperature of 230° F. for two hours. This is not usually practicable, except in a disinfecting oven constructed for the purpose. But they may be exposed to the strong fumes of burning sulphur for twelve hours without injury.

Mattresses, pillows, and padded blankets, if much soiled by the discharges from the patient, cannot be easily disinfected, except by fire, and had better be burned.

In nursing the patient, clean, soft, white rags should be used, instead of handkerchiefs, for wiping away infectious discharges, and thrown at once into the fire.

The following upon disinfection is extracted from the report of a committee to the American Public Health Association:

For Excreta.—(1) Fresh chloride of lime in solution, 4 parts to 100.

(2) Corrosive sublimate, }
Permanganate of potash, } of each $\frac{1}{2}$ of an oz. to a gallon of water.

Of either of the above solutions a half pint or more should be placed in the bedpan or chamber-pot, before the patient uses it. They should remain mixed two hours before the vessel is emptied.

For Soiled Clothing, Bedding, Etc.—(1) Destruction by fire.

(2) Boiling at least one half hour.

(3) Immersion for four hours in a solution of corrosive sublimate, 1 part to 2,000, i. e., about 30 grs. to a gallon of water.

(4) If injured by immersion, may be disinfected by dry heat or by fumigation, as mentioned above.

For Furniture and Wooden, Leathern, and Porcelain Articles.—Washing repeatedly, while used in the sick room, with—

(1) Corrosive sublimate solution, 1 part to 1,000 of water; that is, 60 grains to the gallon.

(2) Solution of fresh chloride of lime, 1 part to 100.

(3) Solution of carbolic acid, 2 parts to 100.

For the Person.—For washing the hands and the general surface of the body of the nurses and of the convalescents, when changing their clothing to leave the sick room, either of the above solutions of chloride of lime (2), or of the carbolic acid (3), or the solution of chlorinated soda, diluted with 9 parts of water (1 to 10).

For the Dead.—Envelop the body in a sheet thoroughly saturated with either of the following:

(1) Chloride of lime in solution, 4 to 100.

(2) Corrosive sublimate in solution, 1 to 500.

(3) Carbolic acid in solution, 5 to 100.

For the Sick Room.—(a) While being occupied, wash at intervals all surfaces with one of the same solutions recommended for the furniture.

(b) When vacated: Fumigate by burning four pounds of sulphur for every 1,000 cubic feet of space in the room. Before doing this, close up the room as tightly as possible; stop every crack and crevice, even to plugging the keyhole. After twelve hours throw open the doors and windows, and ventilate freely. Then have all the surfaces washed with one of the solutions for furniture, and afterwards with soap and hot water.

For Disinfecting Privies, Garbage Heaps, Cesspools, Drains, and Other Offensive Places.—Fifty pounds of copperas (sulphate of iron, green vitriol) to a barrel of water, or $1\frac{1}{2}$ pounds to a gallon.

It may be used freely, and repeated as often as odors arise. It is cheap and efficient. About four gallons are required to disinfect an ordinary vault used by one family. A smaller quantity may then be poured in occasionally.

For Sink Pipes and Water-Closets.—One pound of nitrate of lead to a gallon of water. Use freely.

Note.—There are a large number of proprietary “disinfectants,” so called, in the market. Most of them are simply deodorizers or antiseptics, of perhaps some value to stop a stink, but are entirely untrustworthy for disinfectant purposes.

OFFICE OF NEW YORK BOARD OF TRADE AND TRANSPORTATION, }
NEW YORK, December 5, 1892. }

Dr. J. R. LAINE, *Secretary State Board of Health, Sacramento, Cal.:*

SIR: At the request of the Committee on Quarantine, I inclose herewith a printed circular which will explain itself. The committee will be indebted to you for an expression of your views on the subject referred to, as they believe such views as you may give will be of much value to them in their investigations.

DARWIN R. JAMES,
Secretary.

ROOMS OF NEW YORK BOARD OF TRADE AND TRANSPORTATION, }
NEW YORK, December 5, 1892. }

A Special Committee of the New York Board of Trade and Transportation has been appointed, pursuant to resolution, and is seeking information, data, and opinions touching quarantine, and the advantages, if any, of establishing a uniform system in the United States, under the management of the General Government; the intention being, if the weight of opinion and evidence favor the proposition, to prepare suggestions for congressional legislation on the subject.

The members of the committee are: Chairman, Hon. Oscar S. Straus (ex-U. S. Minister to Turkey), of L. Straus & Sons, importers of china, glass, etc.; Mr. Jeremiah Fitzpatrick, of J. Fitzpatrick & Co., importers and manufacturers of plate glass, looking glass, etc.; Mr. Edward H. Cole, of The Eaton, Cole & Burnham Co., well machinery and brass goods; Mr. Elias S. A. De Lima, of D. A. De Lima & Co., foreign commission merchants; Mr. Ambrose Snow, of Snow & Burgess, shipping and commission merchants.

The committee have adopted the following line of inquiry, and invite such suggestions and opinions thereon as they may be willing to make public, from experts and professional men having practical experience in sanitary affairs, and from others having opinions on the subject:

First—Quarantine administration in foreign countries as furnishing precedents for the United States.

Second—The present status of quarantine in the United States: (a) National; (b) State.

Third—The existing system of quarantine administration in the United States: (a) Cost; (b) Restrictions imposed on commerce and travel; (c) Security afforded.

Fourth—A national quarantine: (a) Would it lessen the existing imposts upon commerce? (b) Would restrictions on commerce and travel be less injurious? (c) Would it afford increased security to the country?

Persons writing the committee are requested to affix to their names their professional or special titles, if any, and to address their communications to Hon. Oscar S. Straus, Chairman, 55 Liberty Street, New York, N. Y.

Respectfully, etc.,

DARWIN R. JAMES,
Secretary.

OFFICE CALIFORNIA STATE BOARD OF HEALTH, }
SACRAMENTO, December 26, 1892. }

Hon. OSCAR S. STRAUS, *Chairman Special Committee of New York Board of Trade and Transportation, No. 55 Liberty Street, New York City:*

SIR: In reply to questions one to four, propounded in a circular relating to quarantine accompanying a letter signed by Secretary Darwin R. James, I will say that the first question might properly be passed by without discussion, inasmuch as the establishment of any kind of quarantine has for its only object the protection of the people of the United States and those who act in conjunction with them. The study of quarantine administration in foreign countries will be instructive, but it should not be prosecuted with a view merely to finding precedent for our future action on this continent. It would be well to divest ourselves at once of any leaning or dependence on other countries, and to adopt a course best suited to our present and future necessities.

I would, however, call your attention to Dr. Shakespeare's very com-

prehensive and voluminous report to the President on this subject, with special reference to Asiatic cholera.

The present status of quarantine in the United States is mixed, being partly national and partly State. Each is distinctly separate and different in function, but identical in purpose and interest. Under the present system there must of necessity be a want of uniformity of administration, with weakness at points in the line of defense. Such uniformity of administration as would bring all defensible points to a parallel degree of efficiency cannot be too strongly urged; but this cannot be put into successful operation while it is possible for the State and national authorities to conflict.

The national quarantine administration is under the management of the General Government, through the Treasury Department, which delegates it to the Marine Hospital Service. Its efficiency has so far been unquestioned, and it has everywhere met the full expectations of the public where it has been invested with means and authority to act. It has the positive advantage of mobility, which the State authorities cannot possess. Any want of suitability of local administration may be corrected by a change of station, which is impossible in State and municipal affairs. The cost of the Marine Hospital Service may be ascertained in the United States Treasurer's report.

The restrictions to be imposed on commerce and travel would, it is hoped, be increased rather than diminished under a national administration, inasmuch as security to ourselves is the prime object of quarantine. But the asperities of such restriction might and should be reduced, so as to bear as lightly as possible, by the establishment of suitable refuge stations, the separation of the sick from the well, and the detention of suspects in isolated and commodious quarters. But the restrictions on commerce and travel should cover a wide range. It should, under certain conditions, to be determined by competent authority, be absolute. A total suspension of commerce and travel for a time would prove less injurious to commerce itself than the presence of an Asiatic pestilence for the same period. Add to the injuries to commerce the injuries to national prosperity produced by an unsettled and panicky condition of the public mind, and the financial results are appalling and far-reaching in their ultimate effects.

A national quarantine system under the control of the General Government would undoubtedly lessen the existing imposts on commerce, and also modify advantageously the restrictions on commerce and travel. It would most certainly afford increased security to the whole country. There would be the decided advantage of uniformity of administration under the central authority of the Government. Such deviations as were found necessary at the point of action could be provided for. But the laws under which the restrictions are applied would be known at home and abroad, and all requirements would be weighed and anticipated. Duplicity and want of good faith are less likely to be found in an officer of the General Government than in the State and municipal appointee, whose brief official tenure is obtained through political influence, which hampers him with a sense of personal obligations that he cannot evade without ingratitude. Add to this the multiple and heterogeneous duties of a Health Officer in one of the large cities, and it need not seem unreasonable that the great mass of people remote from the seaboard view the situation with alarm and apprehension. For it must be generally under-

stood that a careless, inefficient, or corrupt State or municipal administration of quarantine at any point along the borders may endanger all.

There can be no doubt but that the Government officer placed at his station, and invested with authority to perform specific functions, will have the confidence and moral support of the people of the interior; while the State and municipal officer, no matter how capable and high-minded he may be, cannot have equal confidence and support. There must also be considered the moral aspect of the question, the question of right. The interior claims by right that our national defenses shall be made sufficient. If a foreign enemy were to invade our shores or borders, no one questions the right of all the States to repel the invaders. How much greater is their right to demand that our shores and borders shall be guarded against an invasion that is terrible and loathsome. This is not a question that admits of sentimental considerations.

The authority of the General Government may be applied to all matters of a national system of maritime and interstate quarantine, without trending upon the rights and prerogatives of States to manage their own local affairs. But a State or municipality has no greater moral right to use its powers in such a way that other States shall suffer, than has the individual. There inheres in the National Government a police power for national purposes, in the State Government for State purposes, and where delegated to county, city, or town, for local purposes. There are times when the vigorous exercise of this police power must be invoked for the protection of society. This power, which is the essence of all social order, may not be evaded or relinquished. The citizen of an interior State has the same right to invoke the general police power of the National Government for protection against an invasion of cholera, as he has to call upon his local Health Officer to abate a local nuisance. Will a rich, intelligent, and powerful country continue to jeopardize its prosperity by a trustful faith in the ability of any local government to act for the whole people? Is it just to impose upon the local government the enormous cost of such quarantine? With a full knowledge of the power of local politics and meretricious influences, is it wise to leave our defenses entirely or even partially in such hands? It would seem wiser to invoke the authority of the United States, backed by its treasury, and to inaugurate a uniform system of national maritime and interstate quarantine. That such a system would afford increased security, cannot be successfully contradicted. That it would have the confidence of the people there can be no doubt.

The matter of commerce might be so adjusted that only such lines as are least capable of carrying infecting germs shall be transported during seasons of danger, but there should be scope in the laws for a total and absolute inhibition of all commerce, if the exigency for such an extreme measure shall arise.

I believe that the placing of capable and trustworthy medical inspectors at all infected foreign ports would be of first importance. Their authority should be superior to officers of customs and shipping agents, who should not be permitted to issue clearance papers until after a full compliance with the requirements of the medical inspector. A report by cable would vouch for the condition of vessel, crew, passengers, and cargo, when leaving port.

An absolute inhibition of travel and commerce with any port that

refused to comply with imposed conditions would narrow the quarantine service to practical proportions.

Very respectfully,

J. R. LAINE, M.D.,
Secretary California State Board of Health.

OFFICE CALIFORNIA STATE BOARD OF HEALTH, }
SACRAMENTO, January 29, 1893. }

L. A. ELSTER, M.D.:

SIR: You are hereby appointed Special Inspector for the California State Board of Health, to investigate the spread of smallpox in San Luis Obispo and vicinity, also at San Francisco and Sacramento.

You will at once proceed to San Luis Obispo and consult and advise with the local health authorities, and ascertain if due precautions are being taken to restrict the spread of the disease in each case that is known to exist, and to report, in detail, the preventive measures adopted. You will also impress upon the local health officials the necessity of complete isolation of the sick, and a prompt vaccination of all who have been exposed to the contagion. You will proceed beyond San Luis Obispo to such other localities as authentic reports show your services necessary in that direction, and report at your earliest convenience such cases as you may gain knowledge of. On your return you will stop at San Francisco and consult Dr. Jas. W. Keeney, Health Officer, and obtain exact information as to the number of cases existing in that city, and how many have occurred since the first outbreak.

You will then return to Sacramento and investigate the cases known to be there.

J. R. LAINE,
Secretary State Board of Health.

SAN LUIS OBISPO, CAL., February 3, 1893.

Dr. J. R. LAINE, Secretary State Board of Health:

DEAR DOCTOR: I am happy to state that at the present time the local authorities have taken all possible means to prevent further extension of smallpox in this town and vicinity, and that there is now no danger of the disease being communicated to persons visiting the town. I have talked with Dr. Snow by telephone, and he assures me that they have no cases there, and have taken all necessary precautions. It is reported here that there are or have been some cases at Santa Cruz, and I will stop there on return trip. In justice to the people of San Luis Obispo, the present situation ought to have as wide publication as practicable, as the business of the town is suffering from exaggerated reports which had a basis in the truth, but are likely still to be repeated and further exaggerated. The general sanitary condition of the town is being improved, and in that way the panic will be quite an advantage.

Every courtesy has been shown me, as representative of your Board, and I shall be able to make a very full report of the source of the infection and history of the cases which have occurred. I have visited the

railroad camps where the first cases appeared, and find them now in good condition, and no cases there now but a case which is probably one of smallpox, which I recommended the surgeon to have removed to the hospital here, as soon as a proper arrangement can be made with the Board of Supervisors. On return here I consulted the physician in charge, and the resident member of the Board, who expressed their willingness to do as suggested, so that I hope the patient will be brought here to-morrow evening, at which time the smallpox ward will be vacated by the three convalescents now there, and the ward cleansed, so that no danger will be incurred by the patient should he prove to be not already infected. There is, however, a strong probability that in the next forty-eight hours he will show the eruption.

The local daily of to-morrow will be sent you, and the Health Officer will make reports of any new cases. I expect to take the stage early to-morrow morning, and be in San Francisco by Monday or Tuesday. My address there will be The Irvington.

Very respectfully,

L. A. ELSTER, M.D.,
Special Inspector, State Board of Health.

QUARANTINE CONFERENCE WITH ARIZONA.

The State Board of Health of California had congratulated itself that an admirable location for a quarantine station had been selected at El Rio, near the dividing line between California and Arizona, within a few miles of Yuma, A. T. Very soon the Board was compelled to meet so many objections from residents of Yuma, and persons very much interested in the welfare of the Indians at the Yuma Reservation, that it was decided as advisable to abandon the location selected and seek another. While in doubt as to where the best place for that purpose could be found, a letter was received by the President of the Board from A. N. Towne, General Manager of the Southern Pacific Railroad, who had always taken a very lively interest in the matter of quarantine selection, offering every facility and assistance possible to the Board, stating the very pleasing fact that the Governor of Arizona had become very much interested in the matter of joint and mutual protection from invasion of contagious disease by California and Arizona, and had appointed Dr. Goodfellow Territorial Health Officer, with full power to make any arrangement with California that would be acceptable to both, and requested that I appoint a time and place for holding a conference for the full discussion of the subject of joint quarantine. Accordingly, I appointed Colton, San Bernardino County, as the place, and June 14, 1893, as the time. I was very fortunate in obtaining the presence of Dr. J. H. Davisson, of Los Angeles, a member of the State Board, who rendered me valuable assistance with his counsel and advice; also, Dr. M. F. Price accepted an invitation to be present, and assist me with his full knowledge of that section of the country wherein a detention hospital probably would be located.

We met Dr. Goodfellow at Colton, accompanied by Hon. Judge Wright, of Arizona District Court. Judge Wright was chosen as presiding officer and Dr. Price as Secretary of the convention. A free and

full discussion was entered into by the representatives of California and Arizona, resulting in a perfectly complete harmony of proposed action.

While California and Arizona would each act for its own protection, there would be such a unity of action as to greatly increase the protective influence of interstate quarantine. During the year previous to this conference a lack of confidence existed in the California State Board of Health as to the security of quarantine on our southeastern border, occasioned by what was considered at that time an unpleasant, apathetic indifference on the part of our neighbor. But now I am pleased to be able to congratulate the Board with the fact that that feeling has been entirely and totally dispelled by the hearty and enthusiastic coöperation of Arizona with California, both looking forward to the same end—namely, united, harmonious interstate protection from contagious disease.

It also affords me much pleasure to be able to congratulate the Board on account of the excellent arrangements completed all along our border for protection from invasion of disease. From Albuquerque, New Mexico, and from El Paso, Texas, through Arizona on lines of Southern Pacific Railroad and Atlantic and Pacific Railroad; from Sacramento to Ogden, Utah, by Central Pacific Railroad, and to Seattle, Washington, by California and Oregon and Northern Pacific, necessary arrangements are so completely made as to require only a very short time to put the entire system of protection in operation. Governor Colcord of Nevada, at a recent interview, heartily concurred in all of our efforts in that direction, enthusiastically coöperating with the Board in any movement for our mutual protection. We had the pleasure of an interview with a representative of the Atlantic and Pacific Railroad, who cheerfully offered any assistance in his power to increase the efficacy of our plan of procedure. After a free interchange of opinions as to sanitary matters, which no doubt were of benefit to all, the conference adjourned *sine die*.

Upon advising with Dr. Davisson as to the selection of a location for a detention hospital at some point embracing most of the necessary qualifications for the purpose, I decided to request Dr. M. F. Price, at his earliest convenience, to take charge of such duty, and to report to me as soon as he had arrived at a definite conclusion. I selected Dr. Price on account of his large experience and great knowledge of that locality, and his good judgment displayed on other occasions of similar nature. His report is herewith appended.

Respectfully submitted.

C. A. RUGGLES, M.D.,
President State Board of Health.

OFFICE OF HEALTH DEPARTMENT, SAN BERNARDINO COUNTY, }
COLTON, CAL., June 23, 1893. }

C. A. RUGGLES, M.D., *President State Board of Health, Stockton, Cal.:*

DEAR DOCTOR: In compliance with your instructions, I went out to White Water and Cabazon yesterday to look the ground over with reference to a suitable place to establish a quarantine station, should it become necessary. White Water Station may be eliminated from consideration, as it is entirely unsuitable. It is a bleak and sandy desert,

with a universally high wind prevailing, in which it would be almost impossible to spread tents and keep them standing. Cabazon is better situated, and is the only place at all suitable for a quarantine station on the road beyond Banning. It is six miles from Banning, on the Southern Pacific Railroad. There is plenty of good water, there being two sources of the supply: one from an open ditch, which supplies two or three ranches, and the other from the railroad supply, which is in pipes. The quarantine camp could be established to the eastward (the prevailing winds are always from the west) and below the station and ranches, and a ditch cut to it, or a pipe connected with the railroad company's pipe to the camp. There is wood in the vicinity, but it would probably be easier and less expensive to ship it from Banning. All needed supplies could easily be shipped to that point. Provisions could be obtained at Banning, ice from Colton, or all brought from Los Angeles without much delay.

I do not know of anything else to say in reference to it, as this is about the information you desire. I went to Banning and got a team and drove down to these two points, so I had a good opportunity to see the situation and decide the matter on its merits. Now, if there is any further information you may wish, of course you will write me. It was impossible for me to go out any sooner, owing to being a witness in a case in the Superior Court. If it is decided to locate the station at Cabazon, it might be well to have the tents shipped out to that point; I think you said they were at Yuma.

Keep me fully informed as to the situation down here, and post me as to what will be required, in case the emergency arises.

Sincerely yours,

M. F. PRICE.

SANITARY INSPECTION OF STATE INSTITUTIONS IN SOUTHERN CALIFORNIA.

Mr. President and Members of the California State Board of Health:

At the regular meeting of the California State Board of Health, in Sacramento, January 15, 1894, a deputation or committee, consisting of the undersigned, was delegated to make an official and thorough sanitary inspection of the various State institutions located in Southern California and the National Quarantine Station of the United States Marine Hospital Service at the port of San Diego, Cal.

STATE NORMAL SCHOOL AT LOS ANGELES.

January 17th, we visited the State Normal School at Los Angeles, where we were received by Prof. E. T. Pierce, the Principal, and Professor Dozier, both of whom extended courtesies and accompanied us through the institution during school hours, and we noted the many sanitary imperfections connected with the original or old building, viz.: the lack of a proper system of ventilation or air currents through the building to remove the impregnated and dead air from the recitation-rooms, which, it is hoped, may soon be remedied by the fan system of ventilation; also the antiquated and unsafe condition of the subsoil pipes of the original building—of cement, and broken—which should be replaced as soon as possible by iron pipes to avoid serious trouble from leaks, which may occur at any time, and fill the buildings with sewer gas. In this building there are yet to be seen some of the old plunger closets, which, very properly, are soon to be replaced with modern sanitary tank closets, and the lavatories and plumbing generally in the building improved. These unsanitary conditions are a menace to the health and vigor of about four hundred intellectual, ambitious, but not always rugged individuals, whose hygienic conditions and environment should be all that modern engineering skill and sanitary science can afford, to fit them for teachers in the schools throughout the State of California.

A large addition is in course of construction, which will be ample for the present demands of the school. It is a substantial three-story brick, with a fine basement, and adjoins the original building on the west. It is to be equipped with the modern sanitary fittings necessary, and will cost about \$70,000.

We had the pleasure of meeting Mr. J. A. Preston, of the firm of Preston & Locke, architects, who designed the building, and also Mr. O. J. Muchmore, the most competent Superintendent of Construction, both of whom kindly went over the plans with us. The new building is to be supplied with the "fan system" of ventilation, which should be also extended and applied to the old buildings as soon as it can be accomplished.

The gymnasium, a wooden building, recently constructed, is west of the other buildings, and apart from them, and is well appointed and adapted to the needs of such a school.

The location of all these buildings, upon high and dry ground, gives the advantages of pure air and plenty of sunshine, so essential to an institution of this character. There is an abundant supply of pure water from the City Water Company's waterworks.

The Arroyo de les Reyes, a natural waterway, aligns this school property for several hundred feet, and this portion of this natural storm-water drain has not been piped, and while the large amount of storm-water does not materially damage the property of the State, it floods Hope Street and residence property in the neighborhood, and as a matter of justice, the State should contribute to this much-needed improvement. Dr. L. M. Powers, Health Officer of the city of Los Angeles, called my attention to the matter, and it is a subject to be presented to the Board of Trustees for their consideration.

WHITTIER STATE SCHOOL.

January 18th, we visited the Whittier State (Reform) School, accompanied by Dr. W. G. Cochran, ex-President of the California State Board of Health, and at present a member of the Board of Trustees of the Whittier State School. We were met by the Superintendent, Dr. Walter Lindley, and his assistant, Mr. Coffin, and lady, the Matron, all of whom gave us every opportunity for thorough inspection of the institution in all of its departments. The school is well located on high ground, which gently slopes toward the ocean, and near the low hills of the Coast Range of mountains, and far enough inland for the sea-breeze to be tempered so that it is pleasant throughout the year. The grounds are ample, and every attention has been given to hygiene in the buildings constructed; and no better evidence of the successful endeavors of construction and management can be offered than the records of the institution, showing the uniform good health of the pupils and the very low death-rate, which is almost nil. There are at present 340 boys and 70 girls in the school; and the two departments, male and female, are located a mile apart. The building for permanent quarters for the girls' department is now being constructed with regard to the urgent needs of the school, and is to be fitted with all modern and hygienic fixtures essential for comfort and convenience. Every pupil attends school three hours daily, and works four and one half hours daily in one of the industrial departments of the institution. Their industries are varied, and the pupils are placed in accordance with their fitness for the various industries. There is a shoe factory, where all the shoes worn by the inmates are made; a tailor shop, where all the clothing is made; a printing office, fully equipped and run by a number of boys learning the printing business; an electric department, where twenty-one boys, under the direction of Engineer Wiggins, are learning electrical engineering, and generating heat, light, and the power for the entire institution. There are also large classes in carpentry, blacksmithing, baking, type-writing, farming, gardening, dairying, and many in the steam laundry, paint shop, and some studying stenography, while many others are at horticulture, etc. With one hundred and sixty acres of fine productive land well supplied with water, their opportunities for industrial pursuits to fit them for lives of usefulness are all that could be desired. There is a fine musical organization of eighteen pieces, a drum corps, and seven military companies.

The Whittier State School, under its wise and unselfish Superintendent, who puts his whole life into the work, is a model of its kind; and the endeavor of the management to rid it of the odium of a penal institution, and inspire its pupils with all that is essential to scholarship, industry, and manhood, and thus fit them for important positions—which are in many instances now filled by those who have gone forth from the school—should receive the earnest support and commendation of all fair-minded citizens, as many of its inmates are very young and bright children, who are evidently not there for criminal offenses, or because they are incorrigible, but because they, for various reasons, have no adequate homes or proper parental care. This is one of the best reasons for ridding the school of the odium of a penal institution. The change is in the interest of humanity, as it is a misfortune and a blot upon our civilization to stigmatize the lives of these little homeless children by sending them to a reform school. We are pleased to state that since our official visit the sculptor's chisel has removed the ominous and odious legend, "Reform School," from the portals, and substituted the name "Whittier State School" instead—that the future of these little waifs may not be forever smirched for the sins and misfortunes of others.

ASYLUM FOR INSANE AT SAN BERNARDINO.

January 19th, accompanied by Dr. M. F. Price, of Colton, we visited the Asylum for the Insane at Highlands, San Bernardino County, where we were cordially received by the Superintendent, Dr. M. B. Campbell, and his assistant, Dr. A. S. Dolan, both of whom accompanied us through every department and ward of the institution. The asylum is located on high, sloping ground, near the foot of the San Bernardino Mountains, and is a substantial brick structure, with rather economical finish, but well planned for pure air and sunshine. The building is ventilated by the "fan system," economically applied, and run with a water motor, except during the very dry season, when an electric motor is utilized. The building is comfortably heated throughout with registers communicating with steam radiators; it is supplied with modern sanitary plumbing and fittings, and automatic flush-tank closets, and lavatories are arranged for the convenience of the various wards. The water supply is not as abundant as it should be, though there is a fair prospect that more water can soon be developed to answer the increasing demands of the institution and meet the requirements of the future.

The sewage, after passing through settling tanks or basins some distance from the asylum, is being utilized for irrigation on the farm, without any objectionable features as yet.

The asylum is clean, light, and cheery, and the beds and bedding are in good condition. The food supply is abundant and of good quality.

There are 170 patients now in the institution, and it will soon be overflowing, as it is filling up at a rapid rate. It will be necessary to extend the building, as the plans contemplate, to accommodate the immense number of these unfortunates, often thrust upon this section of our State, and many of whom have records of mental alienation in the East and in foreign countries prior to coming here. The means of restraint for the most violent patients are modern and in harmony with advanced civilization.

The institution in all its bearings presents the appearance of proper

discipline, and is kept neat and clean under the apparently economical management of Dr. Campbell.

Since our official visit the asylum is filled to overflowing, there now being about 200 patients, some of whom are cared for outside of the asylum proper.

QUARANTINE STATION AT SAN DIEGO.

January 20th, accompanied by Dr. P. C. Remondino, member of the State Board of Health, and Dr. Magee, Health Officer of San Diego, we visited the national quarantine station of the port of San Diego. We were courteously received by Dr. W. W. McKay, Acting Surgeon of the United States Marine Hospital Service, in charge. The station is admirably located for the purpose, on the west side of the bay of San Diego, near Point Loma, but lacks as yet the three essentials of a complete station, viz.: the steam sterilization or disinfecting chamber, the sulphur fumigation apparatus, and barracks for cabin passengers, in case of detention. The Government has judiciously expended \$52,000 in the construction of the wharf and the various buildings which constitute the station, including their outfitting and a most complete sewer system. The hospital, dispensary, officers' quarters, laundry, and all buildings connected with the station are supplied with modern sanitary plumbing, with automatic flush-tank closets, and suitable lavatories, etc. The tide is at times so swift that it is difficult to board a vessel in a small row-boat, but a naphtha launch has been ordered and is now in transit; it is a necessity, and will be a great convenience to the station.

It is estimated that it will require \$23,000 to complete the station, including accommodations or barracks for cabin passengers, and it is hoped that this may be soon accomplished. For some reason not easily understood, the War Department refuses to give any more land to the station; this land is needed for the barracks back of and adjacent to the station. The War Department owns about 1,100 acres of land on the west side of the bay, including this territory about and including Point Loma. The small plot required for this important service would not apparently be missed from the domain of the War Department. It is a matter of great moment, not alone to California, but to the entire coast and interior as well, and no influence should be withheld that would in any way contribute to the early completion of this most important station. Being located in this natural harbor, and near the Mexican border, and being the gateway for all infectious diseases, as smallpox, yellow fever, typhus, cholera, etc., it is of vital interest to the California State Board of Health; and when this station is completed we should feel that the State of California is secure at the south gate.

The buildings and grounds, and every department of the station, are neatness itself. The station is in charge of Dr. W. W. McKay, an accomplished sanitarian and efficient officer, with his estimable wife and son and four men to complete the personnel of the staff on duty at present. We were afforded every opportunity for most thorough inspection, and kindly supplied with all necessary information relative to the details of the work of boarding vessels and their subsequent inspection.

In order to get additional information, we addressed a letter of inquiry to Surgeon McKay, and received the following in reply, which we submit

as a part of this report, and ask that it be published also in the Transactions of the California State Board of Health.

Respectfully submitted.

J. H. DAVISSON, M.D.
C. A. RUGGLES, M.D.

MARINE HOSPITAL SERVICE, DISTRICT OF THE PACIFIC,
SURGEON'S OFFICE NATIONAL QUARANTINE STATION,
PORT OF SAN DIEGO, CAL., March 22, 1894.)

J. H. DAVISSON, M.D., *Los Angeles, Cal.:*

DEAR DOCTOR: I am just in receipt of yours of the 21st inst., relative to any additional improvements that may have been made here since your visit in January last.

Since that time the station has been supplied with a 35-foot 10 horse-power naphtha launch for the purpose of boarding vessels and carrying supplies to the station; this, of course, is quite an addition to the equipment of the station. I am informed that the plans for fumigating machinery are all ready, but there is not sufficient appropriation at present available for its construction.

An inspection service is maintained here throughout the entire year, on account of the Mexican and lower coast steamers. All the rules and regulations made by the Secretary of the Treasury under the Act of Congress approved February 15, 1893, are strictly complied with.

The total number of sail and steam vessels arriving from October 1, 1893, to October 1, 1894, was 313; total tonnage, 263,109; of this number 180 were from foreign ports.

Any further information you may desire will be gladly supplied. Hoping to see you soon again, I am,

Very respectfully yours,

DR. W. W. MCKAY, M. H. S.,
In charge San Diego Quarantine Station.

SCHOOL HYGIENE FOR PUBLIC SCHOOL TEACHERS.

[Circular No. 5 of the Preventive Disease Series of the State Board of Health.]

This circular is published by authority of the State Board of Health to furnish a short and concise code of instruction to school teachers, so as to aid them in the preservation of the health of their pupils.

Such rules are quite generally understood and observed by careful and experienced teachers, but the lessons of personal and school hygiene must be constantly repeated, that they may become deeply ingrained in the mind as a part of the law of self-preservation.

The single fact that twelve or more years of the life of the individual are frequently spent in the schools is sufficient to demonstrate the importance of the subject.

This circular is devoted to the care of school grounds, the water supply, the water-closets, urinals, or privies, the school-room, the floor, the light, ventilation, warming, wet clothes, hours of study, cigarette smoking, exercise, attention to calls of nature, and contagious diseases.

CARE OF SCHOOL GROUNDS.

This comprises the care of the basement, the school yard, the well or other water supply, and the water-closets, urinals, or privies.

School grounds should be high enough so that water cannot collect in puddles, and should have a wooden grated walk from the back door of the school-house to the water-closet or privy, which should not be situated too far away. Under no circumstances should a water-closet or urinal be tolerated in a school basement. The basement should be kept scrupulously clean, and be whitewashed once a year. It is better to have the floor bituminized. Give pupils no chance or opportunity to commit a nuisance in the basement. It is often better to exclude pupils therefrom altogether.

WELLS, OR OTHER WATER SUPPLY.

If water from wells be used, see that the well is 200 or more feet from the nearest privy. Insist that it shall be cleansed at the beginning of every school term.

WATER-CLOSETS, URINALS, OR PRIVIES.

These should be set well apart for the sexes, and a high and tight fence should run back to the rear of the school yard. But the privies should not be close to this dividing line. Water-closet floors should be bituminized or cemented, and urinals should be vitrified. Privies should be cleansed as often as they become offensive.

Principals or teachers should know from personal inspection the condition of the water-closets and privies, and should promptly report to the

janitor, the School Trustees, or the Superintendent, any cause of offense to sight or smell. If no attention is paid to your notification by the janitor, notify the Trustees in writing, or appeal in the same manner to the Superintendent, and do not give up until the nuisance is abated by cleansing and disinfection. You have a last resort. Appeal by note or card to the Health Officer. Remember that you will have the moral support of all reputable physicians, and that your influence in the community will increase with the care you take of the health of the little ones in your charge.

SCHOOL-ROOM.

The school-room should be kept free from dust and scrupulously clean. The walls should be white or of a light tint, and should be kalsomined twice a year. The sun should shine in the room at least once a day, but do not let it shine on the pupils or on the printed pages they are studying. Have the pupils face a wall with no windows. There should be an abundance of light.

The doors of all school-rooms should be hung so as to open outwardly, to facilitate escape in case of fire or other danger.

Ventilation is very important, but pupils must not be caused to sit in a draft. Many schools can be ventilated by doors and windows only, and in warm weather they may all be left open, but in cold or wet or damp and raw weather, only the windows on the side opposite that from which the wind blows should be let down from the top for ventilation. Always have a reliable thermometer in the room, which should be kept near a temperature of 70° Fahr.

The floor of the room should be perfectly tight. No wind must be allowed to whistle through the cracks. If the floors are not perfect the cracks should be filled with wax or paraffine, for no draft is more dangerous and uncomfortable than that which comes up through a defective floor.

If there is an artificial means for ventilating the room, less care will be needed; but if there are no ventilating shafts, have the windows let down from the top. Do not raise them from the bottom.

RESULTS OF BREATHING THE AIR OF AN UNVENTILATED SCHOOL-ROOM.

Listlessness, headache, lassitude, and indigestion may all be produced by want of ventilation in the school-room, and may aid or result in severe and dangerous sickness.

The brain and mind to be active need pure air in the lungs. Teachers may also, unconsciously perhaps, become petulant, impatient, and fidgety from breathing a close atmosphere in an unventilated school-room. Remember that the young are much more susceptible to such influences than adults.

DRINKING WATER.

Let the young children have water as often as they want it. They need it very often. Place no restriction on them in that respect.

NECESSARY FURNITURE.

In addition to the necessary furniture of a well-appointed school-room, there should be a mirror and a vitrified iron wash-bowl; if there is a hydrant in the vestibule or hall, the latter may be dispensed with. But on no account should there be soap or towel. A class is composed of children from many homes in different conditions of life, and some may have on their hands and faces the germs of contagious diseases. Thus, from using one towel in common, sore eyes, itch, and ringworm may be easily spread, while the more severe contagious diseases may also be communicated by the same means. Let each pupil furnish his own soap and towel. It would be better if each furnished his own drinking cup.

WET CLOTHES.

If a pupil comes in with wet clothes, time must be allowed near the stove or heater to dry them before being permitted to take a seat, and no study should be imposed while in the process of drying.

SCHOOL HOURS.

In California the minimum school age is 6 years. From that age to 8 years the pupils should not be kept in school more than two or two and a half hours. From 8 to 10 years, 3 to 4 hours; from 10 to 12 years, 4 to 5 hours; from 12 to 15 years, 5 to 6 hours; from 15 to 18 years, 6 to 7 hours.

The time consumed during recesses and intermissions is included in these hours, as must also be the time consumed in attending to the bodily functions.

These hours are a little in excess of those usually recommended, but they may be modified to meet the requirements of any school. It is not to be expected that all of what are called "hours of study," which are here called "school hours," shall be devoted to study. To attempt it is to insure injury to health. Let all the pupils in the room at intervals rise and stand in the aisles. It will be still better if they are caused to sing one or two stanzas of a cheerful song. That relieves the mind, fills the lungs, corrects the stoop, rests cramped muscles and joints, and leaves the pupils freshened to resume work.

If the School Board authorizes calisthenics or other physical exercise, let it be gone through with quickness and energy, and then stop. Do not prolong the exercise nor perform it in a slow or dragging manner.

CIGARETTE SMOKING.

To be an habitual smoker of manufactured cigarettes is to be an opium smoker, and an habitual opium smoker cannot be the equal of an abstainer, when everything else is equal. Under no circumstances should a pupil be allowed to smoke them either at school, on the way to or from school, or at home, if the teacher, by admonition, advice, precept, example, or by any influence, can prevent it. Always inform the parents and Principal, or Superintendent, at once when a discovery is made. Use authority and entreaty, for of all seemingly innocent experiments, this is one that most surely leads to moral and physical degradation with

unerring certainty. Neither the liquor nor the tobacco habit can be compared with it. *Nearly all manufactured cigarettes contain opium.* It is this baleful drug that fixes the habit on its victim.

CALLS OF NATURE.

Some teachers seem reluctant to let pupils go out frequently to the closet and urinal. This is a serious mistake. Let them go often. Nervous and delicate children must go out frequently, or they may wet and soil their clothes. Others can contain themselves, but cannot study while doing so. Others suffer from headache and nervous disorders as a result, and are often allowed to stay away from school altogether because they are not permitted to go out as often as nature demands. Very young children should be allowed to go out as often as they desire. It is better to err in favor of the children.

CONTAGIOUS DISEASES.

All children should bear evidence of a successful vaccination when admitted to school.

Any pupil found suffering from a suspicious sore throat or diphtheria, scarlet fever, smallpox, chickenpox, measles, whooping-cough, itch, ringworm, or disease of the eyes, must be excluded until they bring a certificate from a reputable physician that it is safe to let them mingle with other children.

Report all cases of diphtheria and eruptive diseases at once to the Health Officer by letter or card, giving name and number of street.

Where a case of contagious disease exists, all the children of the family should be excluded from school as long as there is danger of communicating the disease.

Never send a pupil to the residence of an absent one to inquire the reason of absence. Perhaps the absence is due to some acute contagious or infectious disease, and the innocent messenger may contract it in that way. It is better to write a note or send the truant officer to inquire.

RECAPITULATION IN BRIEF.

The school grounds must be high and dry.

The basement must be kept clean and thoroughly ventilated.

The well should not be less than 200 feet from a privy, and cleaned out twice a year.

The water-closets, and urinals, or privies, should be inspected daily by the Principal or teacher.

Have all outside doors open outwardly.

Let no blackboards be placed between windows.

Have the pupils face a wall with no windows.

Have perfectly tight floors.

Ventilate well, but do not let the room become uncomfortably cold nor permit pupils to sit in a draft.

Do not let a pupil take a seat in wet clothes.

Let young children have water as often as they want it.

Go through all exercises promptly, quickly, and with energetic precision.

Have a mirror and a vitrified iron wash-bowl in the school-room, but no soap nor towel.

Allow no cigarette or other smoking, and give no opportunity for any kind of vice or nuisance about the school premises.

Let pupils go to the water-closet, privy, or urinal as often as necessary. Let them go too often rather than not often enough.

See that all pupils have been vaccinated.

Report all cases of contagious diseases at once to the Health Officer by mail.

Do not permit them to return until they bring a certificate from a reputable physician that they are no longer dangerous to others.

Send no pupil to the residence of another to inquire the cause of absence. Write, or send the truant officer.

Most of the above rules apply to both city and country schools. In country schools there are no health officers, truant officers, nor janitors, and the teacher must often exercise personal discretion, and be guided by the circumstances of the case. Even in city schools it is well not to trust too much to janitors. It is better for the Principal or teacher to personally inspect the premises and early form a habit of close observation of the sanitary delinquencies and necessities of any school. Be fearless and prompt in demanding what is necessary, and do not be poohpoohed out of your firm convictions.

Firmness and courage go with a knowledge of what is right. Whenever you are in doubt call on the Health Officer or Board of Health, or any physician, and you may rest assured that the medical profession and all intelligent people will sustain and back you in your endeavors to preserve the health of the innocent ones committed to your care.

TUBERCULIN TESTS.

To the Secretary of the State Board of Health:

For the purpose of determining the efficacy of tuberculin in the diagnosis of tuberculosis in dairy cattle, Dr. Ruggles, President of the State Board of Health, enlisted the services of Dr. C. B. Orvis, County Veterinarian of San Joaquin County. They gained permission, on May 21, 1894, from the Directors of the Stockton Insane Asylum, to apply the tuberculin test to the dairy herd connected with the asylum. Eleven animals were separated from the herd, which numbered about fifty head, and submitted to the test. All injections were made on the 21st day of May, at 10 P. M. The following is the result of the test:

No. 1. Cow, 2 years old. 25 minims of tuberculin injected.

Temperature before Injection.	Temperature after Injection.
May 21, 1894—11 A. M. 101.2°	May 22, 1894— 6 A. M. 103.4°
3 P. M. 101.4°	8 A. M. 104.0°
7 P. M. 101.0°	10 A. M. 105.3°
10 P. M. 102.0°	12 M. 104.2°
	3 P. M. 104.2°

Reaction, 3.3°.

No. 2. Spotted cow. Tympanitic occasionally. 30 minims injected.

Temperature before Injection.	Temperature after Injection.
May 21, 1894—11 A. M. 101.2°	May 22, 1894— 6 A. M. 102.4°
3 P. M. 101.4°	8 A. M. 105.0°
7 P. M. 102.1°	10 A. M. 107.0°
10 P. M. 102.0°	12 M. 107.0°
	6 P. M. 107.0°

Reaction, 5.8°.

No. 3. Spotted cow. Curdled milk. 30 mm. injected.

Temperature before Injection.	Temperature after Injection.
May 21, 1894—11 A. M. 101.0°	May 22, 1894— 6 A. M. 100.3°
3 P. M. 101.1°	8 A. M. 102.0°
7 P. M. 101.2°	10 A. M. 104.0°
10 P. M. 101.4°	12 M. 106.0°
	3 P. M. 106.2°
	6 P. M. 106.3°

Reaction, 4.3°.

No. 4. Cow. Persistent œstrum. 30 mm. injected.

Temperature before Injection.	Temperature after Injection.
May 21, 1894—11 A. M. 100.3°	May 22, 1894— 6 A. M. 101.1°
3 P. M. 100.4°	8 A. M. 101.0°
7 P. M. 101.2°	10 A. M. 101.0°
10 P. M. 100.4°	12 M. 101.0°
	3 P. M. 100.4°

Reaction, none.

No. 5. Cow. Thoroughbred Holstein. 30 mm. injected.

Temperature before Injection.	Temperature after Injection.
May 21, 1894—11 A. M. 100.3°	May 22, 1894— 6 A. M. 102.0°
3 P. M. 101.0°	8 A. M. 104.0°
7 P. M. 101.0°	10 A. M. 105.0°
10 P. M. 101.0°	12 M. 106.2°
	3 P. M. 106.0°

Reaction, 5.2°.

No. 6. Cow. Thoroughbred Holstein. 30 mm. injected.

Temperature before Injection.	Temperature after Injection.
May 21, 1894—11 A. M. 100.3°	May 22, 1894— 6 A. M. 101.0°
3 P. M. 101.1°	8 A. M. 100.1°
7 P. M. 101.3°	10 A. M. 100.0°
10 P. M. 101.2°	12 M. 101.0°
	3 P. M. 101.0°

Reaction, none.

No. 7. Cow. 30 mm. injected.

Temperature before Injection.	Temperature after Injection.
May 21, 1894—11 A. M. 100.2°	May 22, 1894— 6 A. M. 100.2°
3 P. M. 100.2°	8 A. M. 100.2°
7 P. M. 100.3°	10 A. M. 102.2°
10 P. M. 100.1°	12 M. 103.0°
	3 P. M. 105.0°
	6 P. M. 104.0°

Reaction, 4.2°.

No. 8. Cow. Coughs very often. 30 mm. injected.

Temperature before Injection.	Temperature after Injection.
May 21, 1894—11 A. M. 102.2°	May 22, 1894— 6 A. M. 103.0°
3 P. M. 103.0°	8 A. M. 103.3°
7 P. M. 103.1°	10 A. M. 105.2°
10 P. M. 102.0°	12 M. 107.0°
	3 P. M. 105.0°

Reaction, 3.4°.

No. 9. Bull. Weight, 1,900 lbs. Holstein. 45 mm. injected.

Temperature before Injection.	Temperature after Injection.
May 21, 1894—11 A. M. 101.2°	May 22, 1894—6 A. M. 100.1°
3 P. M. 101.1°	8 A. M. 100.2°
7 P. M. 101.3°	10 A. M. 100.2°
10 P. M. 101.0°	12 M. 100.0°
	3 P. M. 100.0°

Reaction, none.

No. 10. Bull. Weight, 2,240 lbs. Holstein. 45 mm. injected.

Temperature before Injection.	Temperature after Injection.
May 21, 1894—11 A. M. 101.0°	May 22, 1894—6 A. M. 100.0°
3 P. M. 101.0°	8 A. M. 100.2°
7 P. M. 101.1°	10 A. M. 102.2°
10 P. M. 100.4°	12 M. 104.4°
	3 P. M. 105.0°
	6 P. M. 104.1°

Reaction, 3.2°.

No. 11. Bull. Aged Jersey. 30 mm. injected.

Temperature before Injection.	Temperature after Injection.
May 21, 1894—11 A. M. 101.2°	May 22, 1894—6 A. M. 101.2°
3 P. M. 101.0°	8 A. M. 102.2°
7 P. M. 101.0°	10 A. M. 104.2°
10 P. M. 101.0°	12 M. 105.0°
	3 P. M. 104.4°
	6 P. M. 105.0°

Reaction, 3.3°.

The above tables show that eight out of the eleven head gave a reaction of over 2° Fah., showing that eight out of the eleven head were suffering from tuberculosis.

On May 26th it was decided to hold autopsies on the animals that showed the reaction under the tuberculin test. The autopsies were conducted by Dr. Ruggles and Dr. Orvis, assisted by Drs. Spencer, Maclay, Eddy, and Archibald (veterinarians).

Owing to some misunderstanding only two animals were destroyed, and these two had showed the least reaction under the test.

The following is the result of the post mortems:

No. 7. Cow, five years old; weight, about 1,200 pounds. At the hour of injection, the temperature of this animal was 100.2°; in seventeen hours afterwards, it was 105°. *Post Mortem Appearances:* Slight infiltration at the seat of inoculation. Tumor on the upper third of the neck, adherent to the trachea, was removed, and on cross-section presented an unmistakable tubercular appearance—yellow tubercle softened. Pharyngeal glands tuberculous and undergoing retrogressive changes. Tubercle, in various stages, found on the pulmonary, costal, and diaphragmatic pleura, more especially on the left side. Lungs slightly affected, a few noduli being present in the substance of both

lungs. Mediastinal glands also tubercular and undergoing retrogressive changes. Mammary gland slightly infiltrated with a serous fluid, otherwise negative. Liver, negative. Kidneys, negative.

No. 2. Cow, six years old; weight, about 1,400 pounds; calf in utero 7 months. At the hour of injection, the temperature of this animal was 102°; in seventeen hours afterwards, it was 107°. *Post Mortem Appearances*: Infiltration at the seat of inoculation more pronounced than in case No. 7. Pharyngeal glands, tuberculous nodules very numerous, and undergoing retrogressive changes. Two large growths were found adherent to the anterior (superior in man) portion of the diaphragm, which on section presented a striated appearance—somewhat glandular in structure. The main portion of these growths was composed of gray tubercle, softened yellow tubercle being found in the other portions of the tumors. The mediastinal glands were one solid tubercular mass—both gray and yellow. The glands of the abdominal viscera were also highly tubercular. The lungs did not present the appearance of being affected, but on manipulation and section both lungs were found to contain noduli presenting tubercular characteristics. The liver was found to be in an exceedingly bad condition (hepar tuberculosis). Tubercular masses were found in nearly every portion of it, many of which had undergone softening. Mammary gland, kidneys, and ovaries, negative. The uterus was opened and the foetus removed, but no abnormal conditions were found.

Respectfully,

R. A. ARCHIBALD, D.V.S.

On June 17, 1894, at San José, the following test was made by H. A. Spencer, V.S., at the solicitation of Dr. C. A. Ruggles, President of the State Board of Health:

The animal was a high-grade Jersey cow; age, six years; weight, 1,000 pounds. Hour of injection, 10:30 P. M.; amount injected, 30 minims.

Temperature before Injection.		Temperature after Injection.	
June 17, 1894—	8:30 A. M. 100 $\frac{1}{2}$ °	June 18, 1894—	6 A. M. 100 $\frac{1}{2}$ °
	9:30 A. M. 100 $\frac{1}{2}$ °		7 A. M. 101 $\frac{1}{2}$ °
	10:30 A. M. 101 $\frac{1}{2}$ °		8 A. M. 102 $\frac{1}{2}$ °
	11:30 A. M. 101 $\frac{1}{2}$ °		9 A. M. 104 $\frac{1}{2}$ °
	12:30 P. M. 101 $\frac{1}{2}$ °		10 A. M. 106 $\frac{1}{2}$ °
	1:30 P. M. 102 $\frac{1}{2}$ °		11 A. M. 106 $\frac{1}{2}$ °
	2:30 P. M. 102 $\frac{1}{2}$ °		12 M. 106 $\frac{1}{2}$ °
	4:30 P. M. 103 $\frac{1}{2}$ °		1 P. M. 106 $\frac{1}{2}$ °
	5:30 P. M. 104 $\frac{1}{2}$ °		2 P. M. 106 $\frac{1}{2}$ °
	6:30 P. M. 104 $\frac{1}{2}$ °		3 P. M. 106 $\frac{1}{2}$ °
	7:30 P. M. 104 $\frac{1}{2}$ °		4 P. M. 106 $\frac{1}{2}$ °
	8:30 P. M. 102 $\frac{1}{2}$ °		5 P. M. 106 $\frac{1}{2}$ °
	9:30 P. M. 101 $\frac{1}{2}$ °		6 P. M. 107 $\frac{1}{2}$ °
	10:30 P. M. 101 $\frac{1}{2}$ °		7 P. M. 107 $\frac{1}{2}$ °
			8 P. M. 107 $\frac{1}{2}$ °
			9 P. M. 106 $\frac{1}{2}$ °
			10 P. M. 106 $\frac{1}{2}$ °

Ante-mortem condition: Fair flesh; gave two gallons milk morning and night; breathing distressed from laryngeal trouble; parotids considerably swollen, evidently of long standing; quite perceptible grating of pleura lower right side; coughs occasionally; peculiar regurgitation

in the œsophagus. (Must be due to the laryngeal or pharyngeal swellings.) Temperature taken for nine consecutive hours on the day previous (June 16th), ranged as follows, commencing at 9:45 A. M. and continuing till 5:45 P. M.: 102.1°, 101.3°, 101.4°, 101.3°, 101.4°, 101.4°, 102.3°, 103°, 102.4°. The variation in temperature determined me to try one more day, with result as tabulated. At 10:30 P. M., June 17th, injected 30 minims tuberculin. Cow milked and fed hay regularly at 7 A. M., 12 M., and 6 P. M.; water *ad libitum*.

Destroyed at 2:30 P. M., June 19th. Autopsy: Thyroid gland weighed nearly 7 pounds and full of tubercular pus; sublingual glands show deposits of caseous matter; mediastinal gland miliary tubercled and caseous material; right lung one immense tubercular tumor and numerous small ones; left lung presented the same characteristics; spleen showed a recent rupture, partially cicatrized; one ovary a complete tubercular deposit in its entirety; left front quarter of udder and inguinal gland involved.

SACRAMENTO, June 19, 1894.

J. R. LAINE, M.D., *Secretary State Board of Health*:

DEAR SIR: On the 2d instant, at the request of your honorable body, I commenced the examination (microscopical) of some specimens of lung tissue handed to me by R. A. Archibald, V.S. Said specimens were immersed in alcohol (dilute).

I have to report as follows: The tissues not being sufficiently hardened to admit of the use of the microtome, they were placed in absolute alcohol for four days. Sections of same were then planted in pure paraffin, and other sections in a mixture of 1 part gelatine, 2 parts water, and 4 parts glycerine, previously cooked and allowed to cool slowly—and again immersed in alcohol. Five sections were then made from these preparations.

The staining process for the microscopic sections was as follows: (1) Immersion in carbol. fuchsin (solution 1) for an hour; (2) then immersing in 10 per cent nitric acid for one half to one minute, to free the non-tubercular tissues of the staining; (3) then washing out the acid by means of 70 per cent alcohol; (4) staining with methylene blue (solution 2); (5) washing with absolute alcohol and immediately afterward with distilled water; (6) immersing in cedar oil, and (7) embedding in Canada balsam.

Twenty-five such sections were prepared and carefully examined under the microscope, $\frac{1}{4}$ objective being used, with eye-piece "C" (Bausch & Lomb), magnifying power 1,160 times. The result of the microscopic examination is affirmative of the presence of tubercle bacilli in large numbers, and I have the honor to so report.

Solution 1 (carbol. fuchsin): 100 g. aq. distil., 5 g. acid carbol. cryst., 10 g. alcohol, 1 g. fuchsin.

Solution 2: 2 gr. methylene blue, 20 gr. absolute alcohol.

Respectfully,

DR. G. C. SIMMONS.

REPORT OF DELEGATE TO PAN-AMERICAN MEDICAL CONGRESS, AT WASHINGTON, D. C.

To his Excellency H. H. MARKHAM, Governor of the State of California:

With a high appreciation of the honor conferred on me by my appointment by you as representative of the State of California to the Pan-American Medical Congress, assembled at Washington, D. C., September 5, 1893, I most respectfully report that while in Boston, Mass., en route to Washington, I saw telegraphic dispatches in the daily papers announcing the existence of Asiatic cholera at Jersey City; that fact having been certainly settled by bacteriological examination of suspected discharges by competent authority at New York City. Knowing full well that previous to my leaving California, although we knew cholera was at the quarantine station in New York harbor, it had been determined by the State Board of Health that if the disease should obtain foothold on the main land, the medical inspection of all passengers by rail into California should immediately go into operation.

Thinking it possible that the Board might act on telegraphic dispatches in newspapers as to the existence of the disease at Jersey City, and on account of possibly unnecessary alarm causing great expense, I deemed it to be my duty to personally investigate the matter; so on Saturday, September 1st, I left Boston, arriving at Jersey City Sunday morning. I immediately sought the office of the Health Department, where I was most agreeably surprised in meeting Surgeon-General Wyman and Dr. Bailache, of the United States Marine Hospital Service, and Dr. Hunt, of New Jersey State Board of Health, whose acquaintance I had previously made. I found national, state, and municipal sanitary authorities all acting as one in perfect harmony, and from these gentlemen I received every kindness and courtesy possible. By invitation I remained at the headquarters of the Sanitary Commission, and every two hours was informed as to the exact condition from reports received from their agents in the field.

I was thus enabled to send a correct account by telegraph to Dr. Laine, Secretary of our State Board. On Monday the reports were more favorable and the aspect more encouraging, and by authority of Surgeon-General Wyman and Dr. Bailache I sent a dispatch to Sacramento that the danger was over. Thus saving, as I believe, the State a great expense for quarantine purposes, which at any other time and under slightly different circumstances might have been perfectly justifiable.

I most cheerfully in this place and in this public manner acknowledge my obligations to the above named gentlemen for their very great kindness to me, and especially to Dr. and Mrs. Bailache, for their hospitality in entertaining me at the United States Marine Hospital on Staten Island.

Having made arrangements with these gentlemen and Dr. Jenkins, quarantine officer at New York City, to keep our Secretary at Sacra-

mento informed by telegraph of any fresh outbreak of the disease, I started for Washington.

The Pan-American Medical Congress, composed of delegates from the United States and all foreign governments on the Western Hemisphere, by special invitation of President Cleveland, was formally opened at 10 o'clock September 5th. Promptly to the minute President Cleveland appeared on the stage, escorted by Right Rev. Wm. Paret, Bishop of Maryland, and Dr. Wm. Pepper, President of the congress. The exercises began with a prayer by the Bishop, when Dr. Pepper introduced President Cleveland, who formally opened the congress with an address of welcome.

It was arranged that for two hours each day the general business of the congress should be transacted, then the remainder of the day was devoted to business of each of the different sections into which the congress was divided. The Section of Hygiene and Quarantine presented the most interest to me. It was most successfully presided over by Medical Director Dr. Gihon, U. S. N., and boasted of a larger attendance than most of the other sections. The personnel of this section was remarkable, being made up of gentlemen of national reputation as sanitarians: Bryce and Montezambert of Canada, Baker of Michigan, Rauch of Illinois, Walcott of Massachusetts, Lindsley of Connecticut, Jenkins and Edson of New York, Lee and Shakespeare of Pennsylvania, and many noted gentlemen from Mexico and South American Governments and the West India Islands—all well and widely known for the deep interest they had taken in sanitary matters. The United States Marine Hospital Service was represented by Surgeon-General Wyman, and the New Orleans Quarantine Station and Louisiana State Board of Health by Dr. Formento.

The time was entirely occupied in the presentation and reading of papers of sanitary character, followed by discussion.

The plans of the United States Marine Hospital Service as to protection of this country from cholera were fully explained and received with much satisfaction. The subjects that presented the principal interest were cholera, typhoid fever, diphtheria, and tuberculosis. The all-absorbing subject for discussion was tuberculosis. While the other named diseases received much attention, this one disease seemed to be paramount in the minds of the section. It was so clearly and so plainly shown that it was communicable, and by what media it was transmissible, that it seemed passing strange that in this enlightened condition of society, this disease was permitted to claim nearly one sixth of all the deaths in the United States. It is simply and solely on account of the people being ignorant on that one very important point: namely, how it is communicable, and how that communicability can be prevented. So fully and distinctly were these facts presented, so forcibly was the necessity of action impressed upon the minds of all present, that as though by inspiration many saw their duty very plainly, on returning each to his own local sphere of usefulness, to begin and teach those unfortunately ignorant on that subject, feeling sure that when the cause and the manner of the transmission of this devastating plague were known and understood, a very great change of improvement must necessarily follow in mortality from that disease.

Among the many subjects read and discussed was one of great importance to many States, particularly to California. I allude to leprosy.

For many years, greatly exaggerated accounts of the contagiousness of this disease have been very prevalent throughout this State, so that mere mention of the word leprosy caused a dread to all. A paper on this subject was read by Dr. Rake, who had had very great experience at the Leper Hospital on the island of Trinidad. He most effectually set aside many of the exaggerated opinions of the contagiousness of this disease, when he stated that in 2,000 cases he twice only was able to trace to direct contagion. His statements had such an effect upon the members of the section that a resolution, asking for governmental precaution against leprosy, introduced by Dr. Lee of the State Board of Health of Pennsylvania, was voted down. While it was conceded that it was communicable by inoculation, even that danger was very much overestimated.

Most respectfully submitted.

C. A. RUGGLES, M.D.

INSPECTION OF HOME FOR FEEBLE-MINDED CHILDREN.

To the State Board of Health:

If there had existed any doubt as to the benefit to the State derived from the annual inspection by the State Board of Health, of the public institutions receiving State aid, it was most effectually dispelled by the visit of inspection to Glen Ellen, the location of the Home for Feeble-Minded Children, made by me June 15, 1894. At a previous visit made by the Board to this institution, a very unfavorable opinion was entertained as to its sanitary condition; much harsh criticism was deservedly indulged in, and severe comments and suggestions were presented as to changes that should be immediately entered into and prosecuted to a finish by those in authority at this institution. There was no difference of opinion among members of the State Board of Health as to the unfortunate condition in which this Home of the Feeble-Minded was found, and the Superintendent, Dr. Osborne, was freely and fully made acquainted with that opinion, and readily agreed with us that something ought to be immediately done, and he assured us that his utmost personal endeavor would be exercised with the Board of Directors in accomplishing the much desired end. And now it affords me much pleasure to say that in his attempt at reformation in that line he has been very successful.

Words will fail to express the difference in condition then and now. It requires actual optical observation to fully realize the change. The first and most important improvement relates to ventilation. The Cottier system has been introduced in the boys' wing of the building, also in the new girls' wing, insuring abundance of fresh and pure air to quarters heretofore sadly deficient in that respect. All rooms and corridors have been wainscoted—a very much needed want for protection of the walls. All walls and ceilings in kitchens and kitchen pantries have been painted in colors very tasteful and pleasing to the eye. Laying concrete floors in the basement and cementing of basement walls will do much to secure dryness to those quarters, and render them more desirable for general use. All floors have been subjected to a process of filling, oiling, and polishing, which makes a very beautiful, cleanly, and pleasant appearance. A large bulkhead, made of concrete, in rear of boys' wing, capped by suitable gas-pipe guard-rail, has been constructed solely by labor of inmates of the institution. It permits a wide and graded area so as to insure ingress of light and air to the basement, and to protect the foundation walls. A general renovation of the departments for idiotic boys and girls has been effected, which, although badly overcrowded, are in much better sanitary condition. I desire to speak of the system of sewerage in operation at this institution in most emphatic terms of approval. I examined it from its inception to its outfall, and found it in my judgment, with its contemplated additional improvements, as perfect and complete a system as can be found in the State. A very rigid and careful inspection was made as to food, clothing, and bedding, with most satisfactory result.

C. A. RUGGLES, M.D.,
Committee.

TESTS FOR IMPURITIES IN DRINKING WATER.

By DR. WINSLOW ANDERSON, of San Francisco.

The following simple tests are issued in order that people who are not practical chemists may have a reliable method of detecting impurities in drinking water.

Water, aside from the usually harmless mineral ingredients which it derives from the earth, is frequently contaminated by excrementitious matter and discharges from industrial establishments. It has been found that rivers flowing through cities, and wells in populous districts, may be contaminated by the germs of cholera, typhoid fever, etc., causing widespread devastation. Sewage or nitrogenous organic matter entering a well or a river disintegrates rapidly, forming ammonia, nitrites and nitrates. Should the sewage be laden with disease-producing germs, such as those of cholera and typhoid fever, the ammonia and albuminoids present in the sewage water act as food for the germs, which multiply rapidly. Such water used for drinking purposes would poison whole communities; hence, the necessity of proper precautions in the water supply.

It is well to remember that water thoroughly boiled is absolutely safe for drinking purposes as far as organic matter and disease-producing germs are concerned, and I would recommend, in the event of an outbreak of cholera or typhoid fever in any city, town, or village, that all drinking water be boiled for half an hour and cooled in covered earthenware vessels before it is consumed.

1. Pure water should be:

- (α) Neutral in reaction.
- (β) Transparent.
- (γ) Colorless.
- (δ) Odorless.
- (ϵ) And should have no residue on evaporation.

(α) GOOD drinking water should not give any reaction with acid (red) nor alkaline (blue) litmus paper.

(β) TRANSPARENCY, and (γ) COLOR.

Test: Fill a 6-inch test cylinder with the suspected water, and place it upon a white sheet of paper. Fill a similar glass with distilled water for comparison. Look through the water from the top. Any turbidity or want of transparency in the suspected water should be sufficient cause to have it condemned for drinking purposes, unless it be filtered and boiled.

(δ) ODOR.—Drinking water should be absolutely odorless.

Test: Fill a 500 cc. (about a pint) Florence flask with the water under examination. Heat it gently up to 43.3° C. (110° F.) or 48.6° C. (120° F.). If any odor develops, the water should be condemned, as it will generally be found to contain organic impurities.

(ϵ) **RESIDUE (Organic).**—Drinking water should never contain any organic matter, as this generally means pollution.

Test: Heat the residue in a platinum dish. If it is dissipated by heat or becomes charred, the water is unfit for use. (See also 2, below.)

(ϵ) **RESIDUE (Inorganic).**—Pure water contains no residue. Good drinking water, however, generally contains from 6 to 30 parts of solids per 100,000.

Test: Evaporate over a water bath 70 cc. ($2\frac{1}{2}$ oz.) of the suspected water in a previously weighed platinum dish. The weight of the residue represents the total solids in each gallon of water. On dividing this by .7, the number of parts per 100,000 is obtained.

2. **DETERMINATION OF ORGANIC MATTER.**—As previously stated, drinking water should not contain any organic matter.

Test: To 250 cc. (about 8 oz.) of the water under examination add 5 cc. (75 drops) of dilute sulphuric acid (10 per cent) and enough of the permanganate of potassium solution (.395 grammes to the liter) to tinge the water a rose pink. Apply heat up to 60° C. (140° F.), and allow it to stand for a few minutes. If the pink tinge disappears it is due to the oxidation of the permanganate of potassium, and organic matter is almost certainly present. Such water should be condemned.

3. **CHLORIDES.**—Chlorine finds its way into drinking water from three sources, viz: (α) sewage (urine) contamination; (β) salt deposits; (γ) seepage from sea water.

Tests: (α) Chlorine may be detected: (1) By its odor; (2) By turning paper dipped in a solution of potassium iodide brown; (3) By bleaching a solution of indigo or litmus.

(β) Chlorides are easily found by throwing down a flocculent white precipitate of silver chloride with the silver nitrate solution. The precipitate is readily soluble in ammonium hydrate, but insoluble in nitric acid.

The amount of chlorides in each gallon of water is estimated by a volumetric solution of nitrate of silver. Drinking water containing chlorides should be boiled, for fear of its being contaminated by sewage.

4. **NITRITES AND NITRATES.**—Whenever drinking water contains either of these salts, it is almost certain that it is polluted with sewage or organic matter, and should be condemned.

Test: Take 1 cc. (16 drops) of the water to be examined in a test tube. Add to this 2 cc. (32 drops) of dilute (10 per cent) sulphuric acid and 1 drop of pyrogallal (.65 gm. to 30 cc. of water). If nitrites or nitrates are present the water will turn an amethyst or wine color.

Tests—Nitrites: 1. They give red fumes when treated with strong sulphuric acid.

2. They give an instantaneous blue color with potassium iodide and starch paste, on the addition of a few drops of dilute (10 per cent) sulphuric acid.

3. They give a dark brown color with ferrous sulphate.

4. Potassium dichromate in solution is converted into a green liquid by the addition of a nitrite and an acid.

Tests—Nitrates: 1. When heated with sulphuric acid, they evolve pungent fumes of nitric acid.

2. When heated with a solution of ferrous sulphate and a few drops of sulphuric acid a black coloration is produced.

3. Evaporate 4 cc. (60 drops) of the suspected water to dryness and add a few drops of phenyl-sulphuric acid (1 part of carbolic acid, 4 parts of strong sulphuric acid, and 2 parts of water); if nitrates are present a reddish color of nitro-phenal is produced.

5. AMMONIA AND ALBUMINOID SUBSTANCES.

Tests—Ammonia: To 100 cc. (3½ oz.) of water add 5 cc. (80 drops) of potassium hydrate solution and 1 cc. (16 drops) of sodium carbonate solution to precipitate the earthy salts. Then add 1 cc. (16 drops) of Nessler's reagent. If ammonia is present the water assumes a yellowish tint and should be avoided, as it is contaminated with sewage or organic matter.

(*Nessler's Reagent:* 35 gms. of potassium iodide in 100 cc. water; 17 gms. of mercuric chloride in 300 cc. water; sodium hydrate (20 per cent) 600 cc. to make 1 liter.)

Tests—Albuminoid Substances: In testing for these substances one of the most reliable methods is to use 1 gm. of tannic acid in 3 cc. of water and 1 cc. of alcohol. Of this solution use 10 cc. in 200 cc. of the suspected water. If the water is free from albuminoid contamination, it should remain clear for several hours. If it becomes colored, the water is unfit for use.

6. MINERAL POISONS.—The most important of these are zinc, arsenic, lead, and copper. Drinking water may be poisoned with one or all of these by being kept or stored in leaden pipes or copper or zinc reservoirs. Much water is rich in CO₂ and the alkaline salts (calcium, sodium, etc.), which act on the lead, zinc, or copper, forming soluble salts of these metals. Commercial zinc nearly always contains arsenic, so that great care should be taken in using stored water. In drawing water from the faucets in the morning always let it run for some minutes to clear the pipes of the stagnant and poisonous water, as plumbers will insist on using leaden pipes and joints.

Tests—Zinc: (α) Zinc may be detected by adding a few drops of ammonium sulphide, with like quantities of ammonium chloride and ammonium hydrate to a test-tube half filled with the contaminated water. If present a white precipitate of zinc sulphide is produced, which is insoluble in acetic acid, but freely soluble in dilute hydrochloric acid.

(β) Zinc gives a white gelatinous precipitate of zinc hydrate with potassium hydrate solution.

Tests—Arsenic: (α) Arsenic is readily discovered by acidulating half a test-tube full of water with a few drops of hydrochloric acid, and allowing sulphuretted hydrogen gas to pass into it. Should arsenic be present a yellow precipitate of sulphide of arsenic is produced, which is soluble in ammonium sulphide, but insoluble in hydrochloric acid.

(β) Arsenical water will produce arsenuretted hydrogen gas by boiling it with potassium hydrate and a piece of pure zinc. This gas blackens paper moistened with nitrate of silver.

(γ) Reinsch's test: Arsenical water acidulated with hydrochloric acid

and boiled with a piece of bright copper, will deposit a gray film of arsenic on the copper.

(δ) Marsh's test: Generate hydrogen by the ordinary method of *pure* zinc and dilute sulphuric acid. To this add the arsenical water. Ignite the gas and apply to the flame a porcelain dish, upon which a black metallic mirror of arsenic is deposited.

Tests—Lead: (α) Lead forms a white precipitate of plumbic chloride with hydrochloric acid.

(β) By adding sulphuretted gas, a black precipitate of plumbic sulphide is produced, which is insoluble in ammonium sulphide.

(γ) Lead forms a white precipitate of plumbic sulphate with dilute sulphuric acid.

(δ) Lead gives a yellow precipitate of plumbic iodide with potassium iodide, which is soluble in boiling water.

Tests—Copper: (α) Copper gives a brownish precipitate of sulphide of copper with sulphuretted hydrogen in an acidulated solution.

(β) It forms a pale-blue precipitate with ammonium hydrate, soluble in excess of either.

(γ) In an acid solution, copper gives a chocolate-brown precipitate with potassium ferro-cyanide.

To detect these mineral poisons in water, it often becomes necessary to reduce a gallon or more of the suspected water to one ounce, by boiling, in order to concentrate the mineral salts.

Should water become contaminated by the excreta from cholera or typhoid fever patients, it will respond to the tests for organic matter and to those for nitrites and nitrates and the albuminoid compounds. The microscope will be able to differentiate between the micro-organisms of cholera, typhoid fever, etc.

Mineral water usually contains chlorides, carbonates, sulphates, etc., of sodium, magnesium, calcium, etc., and as such are of considerable therapeutic value; but should ordinary drinking water from rivers, wells, and water systems contain any of the foregoing impurities, it must be looked upon with suspicion, and had better be boiled for half an hour before it is used for drinking purposes.

Boiling will destroy organic impurities and the germs of disease, but it will not destroy the mineral poisons above named; hence, it becomes a matter of importance to have the water tanks and pipes made of iron, and avoid all lead, zinc, and copper contamination.

A STUDY OF WATER IN RELATION TO HEALTH AND DISEASE.

By GEORGE M. KOBER, M.D., of Fort Bidwell, Modoc County, California.

It is impossible to overestimate the importance of water from a sanitary point of view, for it is not only essential as an article of food, but also for the proper degree of cleanliness of our persons, clothing, dwellings, and surroundings. This fact appears to have been duly appreciated by the settlers in all regions, since homes sprang first into existence wherever nature yielded a bountiful supply of water; indeed, even now we see this well illustrated in the settlement of our own continent. Look where we may, and the land supplied with a spring or traversed by a stream constituted the first choice of our sturdy pioneers. In our towns and cities, the question of water supply has been solved by the introduction of waterworks, but even these vast enterprises are not of modern origin, for in a visit to Rome we will be shown aqueducts which were begun 312 B. C.; these were so large and numerous, that they supplied certainly not less than 300 gallons per head daily for a population of about a million people. Many of these ancient aqueducts have been thoroughly repaired and furnish to modern Rome about 3,000 liters per head. The old Romans were very fond of public and private baths and fountains, as evinced by the baths of Caracalla, the largest mass of ruins in Rome, except the Coliseum; they cover an area of 2,625,000 square yards, and could accommodate one thousand six hundred bathers at one time.

Sources of Water.—The water which we require for our daily use comes to us from the clouds in the form of rain or snow. Of this a certain amount is evaporated; another portion may be collected in cisterns; another soaks into the earth, to reappear in the form of springs; another portion flows off in the direction of surface decline, to join the ponds, streams, or rivers, or it may penetrate the earth sufficiently deep to require us to dig wells for its collection. A high temperature naturally favors rapid evaporation. Some of the water which has percolated into the soil is for the time being absorbed by the roots of vegetation; but in reality there is no loss in nature.

The sources of our water supply may therefore be classified as rain water, surface water (including springs, ponds, streams, rivers), and well water.

1. RAIN WATER.

The mean annual rainfall for different portions of the United States has been tabulated by Dr. Waller, and may be briefly stated as follows:

	Inches.
Northern States east of the Rocky Mountains.....	30 to 50
Southern States.....	50 to 70
Between the Rocky Mountains and the Pacific Coast Range.....	10 to 20
San Francisco.....	20 to 25

Along the North Pacific coast the rainfall increases, amounting to between 70 and 80 inches at Vancouver Island. As we recede from the coast in any country the rainfall diminishes. Fanning gives the average of 40 inches for New England and the Middle States.

One inch of rain would amount, according to Church, to nearly 101 (gross) tons per acre, or on a house-roof of say 20x20 feet area, one inch of rain would be about 250 gallons. With a rainfall of 40 inches per annum, this would amount to 10,000 gallons, or 27 gallons per day.

The average daily supply *per head* in most of our northern cities ranges from 20 to 127 gallons, or more, per day. (Fanning.)

Sources of Impurities in Rain Water.—Rain in its passage to the earth absorbs various impurities from the atmosphere, and these may be augmented from the surface upon which it is received and the receptacles in which it is collected. The impurities in the air are gaseous; the rain water becomes highly aerated, absorbs ammoniac salts, nitric and nitrous acids in small amounts, and, near the sea, chloride of sodium. Air contains on an average about 0.5 gramme of solid matter per 1,000 cubic meters (Remsen), which is equivalent to a little over 0.2 grain per 1,000 cubic feet. The observations of Dr. Miguel at Montsouris show that the rain washes out of the air immense numbers of bacteria, fungoid organisms, and their spores; their number is always greater in warm weather and in the first shower, or after a prolonged dry season, when as many as 200,000 germs per liter have been found. Parkes tells us that the majority of these organisms are micrococci, and that they, as well as the bacilli and bacteria found in rain, exist to a larger extent in the form of germs or spores than in the adult state. In addition, pollen of grasses, flowers, microscopic plants (*Protococcus pluvialis*), and spores of fungi are found in rain, the latter often in sufficient quantity to cause the so-called "colored rain."

During the prevalence of infectious diseases, there is a possibility that the respective germs may thus contaminate the drinking water. The amount of organic matter varies greatly in different localities, and it is to be hoped that examinations in that direction will be more frequently made in this country. The following table shows the average composition of seventy-three different samples of rain water collected twenty-five miles from London, on a specially prepared surface:

	Parts per 100,000.
Organic carbon	0.069
Organic nitrogen	0.022
Ammonia	0.050
Nitrogen as nitrates and nitrites	0.007
Chlorine	0.63
Hardness	0.62
Total solids on evaporation	3.95

The rain falling in towns contains also more or less sulphurous acid, from combustion of coal, and numerous sooty particles.

It has been truthfully said that rain is a great "purifier of the air," but this also implies that rain water is far from being chemically pure; i. e., a compound of oxygen and hydrogen.

Surfaces for Collection.—The roofs of houses are most commonly used as collecting surfaces for rain water. When we remember the accumulations of dust, soot, vegetable and animal matter (leaves and excre-

ment of birds), the lodgment of minute plants, spores, and germs, perhaps deposits of slops carelessly thrown from the upper windows, we see at once the necessity for rejecting the first portions of the rainfall; for this purpose "cut-offs" have been invented, some of them automatic, by which the first portions of the rain are run to waste, and only the purer after-fall is turned into the storage cistern. The public should be made familiar with these facts. At present, Dr. Smart tells us that these separators are but little used. In this connection, it is well to refer to the material of the roof surface, if the water is to be collected for domestic purposes. Painted or galvanized roofs are liable to contaminate the water with particles of paint or zinc; shingled roofs impart portions of decaying wood, and are, moreover, like tiled roofs, peculiarly prone to collect dust and develop the various fungoid growths. For all these reasons slate roofs should be preferred.

Cisterns.—This brings us naturally to the consideration of the storage receptacles for rain water, commonly called cisterns, and the material of which they are constructed is an important factor as regards the purity of the water supply.

Cisterns or tanks of *wood* are objectionable, as wood, especially when exposed to fluctuations of the water-line, rapidly decays and forms a breeding-place for minute worms and other animal organisms. *Lead linings* are more readily attacked by rain water than any other, and should not be used. This is due to the highly aerated character of rain water, and the presence of nitrates and chlorides; but the solution of lead may be prevented by the presence of sulphates, phosphates, and lime salts (Saunders). It is stated by Parkes that new lead-lined cisterns become rapidly coated with a carbonate or sulphate of lead when the water is hard, or with a carbonate and oxide when it is soft; that these deposits form a lining, which protects the surface of the metal from further action, and should therefore not be scraped when the cistern is being cleaned out. *Cement linings* contain more or less lime, and render the water hard; but the greatest objection is their liability to crack, allowing leakage from the cistern or the seepage of sewage matter into the cistern. *Iron* cisterns rust and discolor the water. *Zinc* is readily attacked and dissolved by water, and produces poisonous effects. *Galvanized iron* has been extensively used, and whilst comparatively safe, it has been known to impart zinc to the water. *Slate* is perhaps the best material for lining, but the cemented joints should not be repaired with red lead when they leak, as the lead oxides are decidedly objectionable. *Stoneware* cisterns, whilst very heavy and cumbersome, are valuable, since they give up nothing to water. These, or cisterns made of slate or galvanized iron, should be preferred.

Location of Cisterns.—If located above ground for domestic uses, they should be placed in a light, well-ventilated, and cool position, to retard decomposition of organic matter, and properly covered.

"The cistern should not be used directly to flush water-closets, but may supply the intercepting or waste-preventing cisterns, which should be used for this purpose. The overflow pipe must be carried out into the open air to terminate as a warning pipe; it may end over the open head of a rain-water pipe, if the cistern is in an upper story, or over a trapped siphon gulley when the cistern is near the ground." (Parkes.)

In the construction of cisterns below the surface, the utmost care must be taken to prevent or arrest contamination of the water from slops, sewage, etc. The English River Pollution Commission found a sample of cistern water "to consist of sewage of even greater strength than average London sewage."

In addition to the danger just referred to, cistern water may be polluted by *other impurities*, such as dead rats, mice, birds, cockroaches, and other small vermin which have gained accidental access, and for all these reasons the cistern should be cleaned at regular intervals.

Dr. Smart, of the United States Army, in his report to the National Board of Health, found the cisterns in New Orleans usually constructed of cypress wood, of an average capacity of about 2,000 gallons, and frequently located "in unventilated inclosures, rank with the emanations of unclean privies."

The average accumulation of sediment, organic and inorganic, in cisterns, is about one inch per annum. An analysis of the air-dried mud from one of these cisterns showed:

Per Cent.

Moisture	17.2
Organic and volatile	34.0
Mineral matter	48.8

The results of numerous investigations have led to the conclusion that cistern or rain water is never as free from organic contamination as the water from springs and wells, and therefore its use, except for laundry purposes, has been condemned. With the necessary care observed in the collection and storage, it would seem that rain water should prove useful for cooking and washing, on account of its *softness*, which is due to the absence of the salts of lime or magnesia—one grain of chalk wastes about eight grains of soap. The hardness of rain water is generally less than one half degree; that is to say, there is less than one half grain of chalk, or its equivalent salts, to the gallon of water, and is therefore especially valuable in localities where the other water supply is hard. In this connection it is proper to mention that some large cities, like Constantinople, Venice, Malta, and some of our Southern towns, are still either wholly or in part supplied with rain cistern water.

Dr. Smart considers properly constructed underground cisterns preferable, because the cooler situation does not favor the fermentation of the accumulated sediment; moreover, the mineral or earthy matters of which the underground cistern is constructed introduce into the stored water certain bacteria, which transmute ammonia into nitric acid; they are the bacteria of nitrification. The organic matter of the water is first decomposed into ammonia, and this is subsequently transformed into nitric acid. The tendency of cistern water is to improve during its storage, but this does not hold good in wooden tanks, unless the bacteria of nitrification are introduced, as by throwing into the cistern a quantity of clean gravel, to which these bacteria adhere.

The following table, taken from Dr. Waller's article (Parkes' Hygiene, vol. II, p. 406), shows how impure a cistern water may become:

Analyses of Cistern Water.

(Results expressed in parts per 100,000.)

Location.	Total Solids	Ammonia	Albuminoid Ammonia	Hardness	Chlorine	Analyst.
Podehole	5.28			3.8	0.9	River Poll. Comm.
Sheffield Barracks	12.00	0.130		5.8	1.6	River Poll. Comm.
Greasely	126.60	0.730		55.70	11.5	River Poll. Comm.
Boston, Mass.	5.28	0.013	0.008		0.32	W. R. Nichols.
Newport, R. I.	7.50	0.0105	0.0275	3.73	0.76	E. Waller.
Omaha, Neb.	6.70	0.012	0.0136	4.03	trace.	E. Waller.
Cincinnati, O.	2.68	0.004	0.123		0.55	C. H. Stuntz.
Cincinnati, O.	4.48	0.027	0.118		1.97	C. H. Stuntz.
Wilmington, N. C.	5.05	0.002	0.015		0.70	C. W. Dabney.
Wilmington, N. C.	6.90	0.016	0.008		0.52	C. W. Dabney.

Snow Water is considered quite as impure as rain water, and possibly more so. Tissandier, quoted by Dr. Waller, obtained the following results with snow water after it had been melted:

	Solids per 100,000 parts.
Falling in a court in Paris	21.2
Falling on towers of Notre Dame	11.8
Falling in the open country	10.4

About 60 per cent of these solids was mineral matter, and besides these the snow also contained ammonium nitrate. The amount of ammonia, and hence the probable amount of organic matter, has been found to vary with the temperature at which it falls, the nature of the surface on which it falls, and the character of the flakes. (See Vogel, p. 407; Parkes, 2d vol.) In this connection the article of Dr. Charles Smart, U. S. A. (*Am. Jour. Med. Sciences*, Jan., 1878) is especially interesting. He found the greatest amount of ammonia in the first snows which fell in large heavy flakes at Camp Douglas, Utah, and attributes the origin of mountain fever to the malarious poison contained in such water. Dr. Brewer, of the Army, also speaks of the Western mountaineers attributing this fever to the use of snow water. (*Bucks' Hyg.*, II, pp. 129-134.)

2. SURFACE WATER. (Springs.)

It has already been stated that a considerable portion of the rain soaks into the soil, and after percolating through a mass of rock and soil, undergoing nature's filtering process, it issues forth in the form of springs. In its passage through the soil it absorbs at once carbonic acid from the ground air, which contains two hundred and fifty times more of this gas than the normal atmosphere, and the absorption of this gas adds greatly to the dissolving power of water; hence, the mineral constituents derived from the rocks over which it passes. The quality of the water depends, therefore, largely upon the geological formation through which it passes. In general terms, the older non-calcareous rocks—granite, sandstone—afford the least amount of mineral matters, while the calcareous formations yield the greatest amount. In some springs of great depth, the amount of mineral matter is so large as to render the water unfit for dietetic purposes; some of these mineral springs are also thermal,

indicating that they proceed from a great depth and are probably forced up by the pressure of confined expanding gases. But the springs which interest us most just now are formed in a different manner. The rain which sinks through the porous strata—gravel, chalk, sandstone, etc.—by reason of its gravity, may be arrested at a variable depth by an impermeable stratum of hard rock or clay. Here the water accumulates and forms those underground reservoirs of subsoil water which supply the springs and wells. The water naturally tends to find its own level, and may find this outlet into the sea, or a river, or in springs on a hill side at a much lower level. The springs are therefore formed by the “cropping out,” on the surface of the earth, of such an impermeable stratum, which prevents it from further percolation.

Springs are spoken of as “main” and “land” springs. The former are the deep-seated springs issuing from regular geological formations (such as chalk, oolite, sandstone), and generally yield a constant flow, though subject to seasonal variations. The “land” springs draw their supply from a near and limited collection of underground water in superficial beds of sand and gravel overlying a stratum of clay; they are often intermittent, and frequently go “dry” during the summer months; they are also more liable to contamination than the main springs.

The amount of water yielded by the springs is naturally influenced by the rainfall of the district, and the amount of evaporation; the latter explains the fact that during the winter months from October to March, springs yield a larger supply. The yield of a spring may be readily estimated by ascertaining the length of time required to fill a vessel of measured capacity.

In the discovery of a new spring, it is advisable to determine as far as possible its source, as the following somewhat amusing incident, which occurred here, will indicate: A member of the Hospital Corps surprised the Post Surgeon with the announcement that he had discovered a spring near the brow of the hospital hill. The doctor found a clear, cold spring, yielding a large volume of water. The discovery was announced to the commanding officer, who repaired with his staff to the designated spot, and all regarded the clear, cool spring, in the midst of a California summer, with intense satisfaction. The water was pronounced superior to the water supply of the Post, which was a mountain stream distributed in pipes from an impounding reservoir above the hospital. The commanding officer directed the Quartermaster to take the necessary steps for the protection and utilization of the spring. In the midst of this joy I was informed of the valuable discovery, but having served at the Post for several years, I was incredulous as to its being a natural spring, and suggested the possibility of a “leaky main.” The suggestion was followed up, and led to the discovery of damaged water-closet pipes, a constant flow of water having passed through the closets, and a portion of the drain, by some unaccountable disunion in the latter, found its way into the soil, and being held up by an impermeable stratum, issued forth as a spring about one hundred yards below the hospital. It is needless to say that the spring disappeared after the repair of the pipes.

Composition of Spring Water from different Formations. (Results given in parts per 100,000.)
English River Pollution Commission, Sixth Report; quoted by Waller.

Formation.	Total Solids	Organic Carbon	Organic Nitrogen	Ammonia	Nitrogen as Nitrates, etc.	Chlorine	Hardness	Number of Samples
Granite and gneiss rocks	5.94	0.042	0.008	0.001	0.106	1.69	3.0	8
Silurian rocks	12.33	0.051	0.014	0.001	0.178	1.84	6.8	15
Devonian rocks and old red sandstones.	25.06	0.054	0.012	0.001	0.764	3.85	12.0	22
Yoredale and mill stone, grits and coal measures	21.91	0.050	0.014	0.001	0.393	1.85	13.1	22
Lias	36.41	0.073	0.019	0.001	0.467	2.48	30.1	7
Oolites	30.33	0.043	0.011	0.001	0.402	1.55	24.4	35
Chalk	29.84	0.044	0.010	0.001	0.382	2.45	23.6	30
Fluvio-marine, drift, and gravel.	61.32	0.086	0.019	0.001	0.354	2.76	37.6	10

Summary.—Springs afford good sources of water supply for general domestic purposes, provided surface pollution is prevented. "Main springs" are preferable, because they are less liable to accidental contaminations, but they generally contain a greater amount of the earthy salts, which give the water the quality of hardness. In other respects, especially in limestone regions, the water is clear, cool, and sparkling. Soap does not form a lather with hard water until the lime and magnesia have been precipitated in the form of curdy salts. If the hardness depends upon the presence of bicarbonates of lime and magnesia, it may be removed by boiling, because heat drives off the carbonic acid, and the less soluble carbonates are precipitated in the form of white flakes; this is called "temporary hardness," in contradistinction of what is called "permanent hardness," which is due to the presence of sulphates, and cannot be removed by boiling.

At one time it was considered of the greatest importance to know exactly how many grains of each particular salt were contained in drinking water, but this is not so essential, for none of the earthy or alkaline salts usually found in water will do harm, unless present in sufficient quantities to constitute mineral waters, which will be detected by the disagreeable taste.

What we do want to know in the matter of spring water is, whether it is free from soakage of the wastes of human life and occupation. It will be readily understood how, in a "land spring" issuing through very porous strata, like gravel, sand, or fissured rocks, the water may have been contaminated by manured fields, barns and stock-yards, cess-pools, and other waste products. This is especially liable to take place if the spring is situated at the base of a hill, on the top of which the polluting influences are going on. In such cases, the dip of the strata will enable us to estimate the probable amount of danger, and a bacteriological examination of the water may also furnish valuable information. Thus Wolfhügel found that in springs which were well protected against the infiltration of impurities, the number of germs contained in 1 cc. was only 182; whilst in springs not so protected, they amounted to 2,730.

3. SURFACE WATER. (Streams, Rivers, Lakes, and Ponds.)

The English River Pollution Commission, 6th Report, estimated that about half of the water descending as rain finds its way into the streams.

In many mountainous districts in the United States and elsewhere, the water which flows off the hillsides is frequently collected by the construction of dams across the cañon through which the stream flows, forming a so-called "impounding reservoir," from which the town or community may be supplied. My personal observations, and those of others, lead me to believe that it is always best to conduct the water in an open ditch to another reservoir before distribution, and to reject the water, unless absolutely necessary, which flows into the "impounding reservoir" during the early spring freshets. There is every reason to believe that apart from the greater amount of earthy matter contained in turbid streams, the amount of organic matter is also largely increased, and may even be a source of water-borne malaria. (See interesting Report of Dr. Smart, *Am. Jour. Med. Sciences*, January, 1878, p. 37.)

Impurities.—The amount of *mineral* matter contained in streams, ponds, and lakes depends not only upon the character and amount contained in their original sources, but also upon the geological character of the country and the erosive power of the streams. The *organic* impurities, as already indicated, are of greater interest to the sanitarian than the mineral constituents. The vegetation in ponds, lakes, and streams, and along their banks, supplies a certain amount of the organic matter, and the winds or rains sweep in more or less, but all this is insignificant when compared with the pollution of animal matter.

The watercourses are the natural drainage channels of a country, and it is not surprising that the wastes of human life and occupation should find their way into the rivers. It is for this reason that the water of streams running through cultivated valleys, with cities, towns, and villages on their banks, contain, often, a dangerous amount of organic matter, and we have the experience of Plymouth, Pennsylvania, to show that the excreta of a single typhoid patient washed into the stream which was used as a water supply, occasioned more than a thousand cases of typhoid fever. To show the contaminating influence of a town on a river, we may say that the River Maine, just above Würzburg, contained only 177 mgr. per liter of organic matter, whilst immediately below the town it contained 470 mgr. per liter.

Hueppe finds that river water contains micro-organisms of every description: infusoria, algæ, fungi, bacteria, and often also metallic poisons. The number of germs varies with the purity of the stream, from 7 to 125,000 per ccm., and even as high as 10,000,000 have been observed. The amount of suspended matter carried by rivers varies at different times and places, but analysis usually reveals an increase as we descend the stream, as shown by the following table, prepared by Dr. Waller. (Parkes' *Hygiene*, vol. II, p. 410.)

Analyses of Waters of Rivers in the United States. (Results in parts per 100,000.)

River.	Place.	Date.	Mineral Mat- ter.....	Organic and Volatile.....	Total Solids...	Chlorine.....	Ammonia.....	Albuminoid Ammonia...	Hardness.....	Analyst.
Mississippi	Minneapolis, Minn.	1877	240.1	4.2	18.6	1.1	0.003	0.015	11.47	S. F. Peckham.
Mississippi	St. Louis, Mo.	Aug., 1873	45.04	2.1	244.3	1.21	0.002	0.068	8.22	D. V. Dean.
Mississippi*	St. Louis, Mo.	Aug., 1873			47.14					D. V. Dean.
Ohio	Cincinnati, O.	1880			14.2	0.8	0.011	0.048		C. H. Stuntz.
Ohio	Louisville, Ky.	1880			11.7	0.6	trace			T. C. Van Nuys.
Ohio	Evansville, Ind.	1880			18.6	0.9	0.012			T. C. Van Nuys.
White	Indianapolis, Ind.	1880			28.0	0.4	0.003			T. C. Van Nuys.
Cumberland	Nashville, Tenn.	Sept., 1876			13.80	0.3	0.000	0.003	7.86	T. Lupton.
Cape Fear	Wilmington, N. C.	Aug., 1881			5.6	0.4	0.008	0.016		N. R. Nichols.
Hudson	Albany, N. Y.	Mar., 1872	9.30	1.2	10.5	0.52			6.00	C. F. Chandler.
Hudson	Poughkeepsie, N. Y.	Nov., 1877	10.40	1.7	12.1		0.010	0.019		W. R. Nichols.
Hudson *	Poughkeepsie, N. Y.	Nov., 1877			10.1		0.010	0.018		W. R. Nichols.
Croton	New York, N. Y.	1872-1882	5.702	1.678	7.380	0.3	0.001	0.012	3.21	E. Waller.
Schuylkill	Philadelphia, Pa.	July, 1881			12.01	0.56	0.002	0.012	8.6	H. Leftmann.
Passaic	Falls, N. J.	July, 1872	5.28	2.58	7.86	0.43	0.040	0.040		H. Wurtz.
Passaic	Belleville, N. J.	July, 1872	7.36	1.95	9.31	0.47	0.049	0.085		H. Wurtz.

* Filtered.

Self-Purification of Rivers.—A study of the above table indicates that rivers near their source always contain a less amount of organic and mineral matters than after they have made a long run and received the drainage from a densely settled region. It is self-evident that a river, after it receives the sewage of a number of towns, cannot be as pure as before, and the question naturally arises, Can a river once polluted with sewage ever be a safe source of supply below the source of pollution? The question of "self-purification of streams" has been earnestly studied, especially in England, and it may be considered as still unsettled. It is, however, conceded that a certain degree of purification is possible by natural means, viz.:

1. Dilution of the sewage with clean or unpolluted water which empties into the stream along its course.

2. By deposition of the suspended matter, carrying with it some of the organic material.

3. By the agency of organisms in the water, as fish, water-plants, algæ, and infusoria, which require organic matter for their food.

4. By the micro-parasites or bacteria of nitrification, which bring about oxidation of organic matter, and then consume it.

5. By the chemical affinity of certain bodies, by which dissolved and noxious substances are rendered insoluble; as, for example, the effect of sulphuretted hydrogen on certain soluble metallic salts.

Of these factors, Uffelmann considers the influence of the micro-organisms in the process of oxidation of the greatest importance, since his experiments clearly show that the mere presence of oxygen in water without the bacteria of nitrification does not lead to a perceptible diminution of organic matter.

The rapidity of oxidation is influenced by the volume of organic matter present, the temperature of the water, the distance of the run, the rapidity of the current, and the character of the river-bed. It is perfectly natural that a rapid mountain stream going over boulders and rocks should have a better opportunity for aëration than when the current is sluggish.

The various factors named are calculated to purify the water in our streams, provided we give them a chance. This is still true in our own country, but with increasing settlements it is possible that practically here, as in England, the pollution of our streams will almost become continuous from their sources to their mouths. Whilst Dr. Tidy and some other eminent chemists believe that a flow of even ten or twelve miles is sufficient to free a river of all trace of sewage contamination, an outbreak of enteric fever in a hospital using river water was traced to a barracks twenty-five miles up the stream. (Mass. State Board of Health Rep., 1876, p. 284.)

Lake Water.—In many cities a lake constitutes the general water supply, and for the most part a very pure supply is thus obtained, as shown by the following table taken from Dr. Waller's article on water (Parkes' Hygiene, vol. II, p. 410):

Examinations of Water from Lakes and Ponds. (Results given in parts per 100,000.)

	Place.	Analyst.	Date.	Organic and Volatile.	Mineral.	Total Solids.	Hardness.
Lake Michigan	Chicago, Ill.	Blaney	1859	1.81	9.63	11.44	---
Lake Erie	Cleveland, O.	Cassel	February, 1866	1.10	8.23	9.33	3.00
Lake Ontario	Toronto, Canada	Croft	February, 1878	0.77	11.73	12.50	---
Lower Chain Lakes	Halifax, Nova Scotia	Lawson	September, 1878	3.83	3.49	7.32	---
Lake Massabesic	Manchester, N. H.	Hayes	June, 1869	2.77	1.93	4.70	0.84
South Pond	Plymouth, Mass.	Nichols	June, 1877	1.40	1.60	3.00	---
Watuppa Pond	Fall River, Mass.	Appleton	1870	1.43	1.67	3.10	0.34
Lake Konomoc	New London, Conn.	Nichols	December, 1879	1.20	1.60	2.80	---
Artificial Lake	Norwich, Conn.	Silliman	January, 1873	1.16	2.00	3.16	0.93
Lake Owasco	Auburn, N. Y.	Chandler	1876	1.20	15.80	17.00	8.7
Green Lake	Syracuse, N. Y.	Chandler	January, 1871	1.20	14.14	16.34	---
Reeds Lake	Grand River, Mich.	Kedzie	August, 1872	much.	12.98	---	---
Blue Lakes	San Francisco, Cal.	Falkenan	April, 1876	---	---	21.00	---

Glasgow is supplied from Loch Katrine, 34 miles from the city. The water contains only $2\frac{1}{2}$ grains of solid matters per gallon, and is regarded very soft and pure. The saving in soap alone since it replaced the polluted River Clyde, in 1859, is estimated at 36,000 pounds sterling per annum.

Finkener's analyses of European lakes indicate that some contain considerable quantities of chlorine, ammonia, and nitrates.

According to Hueppe, the number of micro-organisms contained in 1 cc. of lake water varied from 8 to 1,384.

Summary.—From the evidence, we may conclude that rivers and streams are always purer near their sources, and when not contaminated, they are good sources of supply. After receiving sewage, a stream may, under favorable conditions, undergo a certain degree of self-purification, but we cannot rest satisfied that dangerous contamination does not exist, and such waters cannot be recommended for dietetic purposes, if any better supply can be obtained. The water supply from ponds and lakes, when not stagnant, but undergoing frequent changes, may be regarded as good, provided it has not been contaminated by the sources of impurity already referred to. No surface water, whether from streams, ponds, or lakes, should be used for dietetic purposes until the suspended matter is removed by subsidence or filtration, or both. We shall learn hereafter that the chemical analysis of a drinking water gives no positive information concerning its wholesomeness. The organic matter in a water may be harmless or dangerous. On general principles, we may infer that whenever there is much organic matter there is a greater likelihood of the presence of disease germs.

4. WELL WATER.

It has been estimated that about one fourth of the rainfall of a certain locality soaks into the ground, and may be obtained by sinking wells. There are, practically speaking, but two kinds of wells: "shallow" and "deep," according as they are less or more than fifty feet in depth.

(a) *Shallow wells* are those sunk into superficial, porous beds overlying an impermeable stratum of clay or rock, commonly called "hardpan," and which tap the underground water held up by these formations. They supply the same quality of water yielded by the "land springs" of the respective locality, and are therefore subject to the same contaminations. The rural population, and for that matter many people in towns and cities, derive their water almost exclusively from shallow wells (pump water). Wherever a public supply from unpolluted sources exists, the use of shallow wells should be interdicted, as it is simply impossible to prevent contamination.

The English River Pollution Commission, 6th Report, stated that in their experience shallow wells are almost always polluted by sewage and animal matters of the most disgusting origin. "The common practice in villages, and even in many small towns, is to dispose of the sewage and to provide for the water supply of each cottage or pair of cottages upon the premises. In the little yard or garden attached to each tenement or pair of tenements, two holes are dug in the porous soil; into one of these, usually the shallower of the two, all the filthy

liquids of the house are discharged; from the other, which is sunk below the water-line of the porous stratum, the water for drinking and other domestic purposes is pumped. These two holes are not infrequently within twelve feet of each other, and sometimes even closer. The contents of the filth-hole or cesspool gradually soak away through the surrounding soil and mingle with the water below. As the contents of the water-hole, or well, are pumped out, they are immediately replenished from the surrounding disgusting mixture, and it is not, therefore, very surprising to be assured that such a well does not become dry, even in summer. Unfortunately, excrementitious liquids, especially after they have soaked through a few feet of porous soil, do not impair the palatability of water, and this polluted liquid is consumed from year to year without a suspicion of its character, until the cesspool and well receive infected sewage, and then an outbreak of epidemic disease compels attention to the polluted water. Indeed, our acquaintance with a very large proportion of this class of potable waters has been made, in consequence of the occurrence of severe outbreaks of typhoid fever amongst the persons using them." (English River Pollution Commission, 6th Report.)

What is true of England is under like circumstances true of this country. One reason why our people do not avoid the dangerous proximity of cesspools and wells, is the widespread belief that water becomes purified by filtration through the soil. Whilst this is true to a limited extent, there is abundant evidence to show that organic matter may percolate into wells from quite a distance. Very few persons, in the first place, realize how extensively soil pollution can take place, and fewer still know how far contaminated water may travel before it reaches a well. In some instances, which will be referred to later, the wells were infected from a distance of 30, 60, and even 100 feet. A case is on record in which a well was polluted by gas works 1,000 feet distant. (Fisher, Dingl. Polyt. Jour., ccxi, 139.)

A well usually drains an area all around it in the form of a circle, and this distance, or radius of the circle drained by the well, is generally expressed in terms of the depression. Field and Peggs state that in fine sands and gravels, which offer considerable resistance to the passage of water, the distance varies from 15 to 39 times the depression. In the chalk, where fissures facilitate the passage of water, the distance is 57 times the depression. In very coarse gravel, which allows free passage of water, the distance is from 68 to 160 times the depression; and in the new red sandstone, where extensive fissures exist, the distance is 143 times the depression. These results are founded on experiments made abroad by sinking borings at different distances around the well, but require confirmation by more extended observation. (Parkes.)

The number of micro-parasites in well water varies, according to Hueppe, from 10 to 75,000 per 1 ccm. He found—

In chemically good well water.....	5 to 52 per 1 ccm.
In chemically doubtful well water.....	12 to 8,160 per 1 ccm.
In chemically bad well water.....	0 to 11,960 per 1 ccm.
In wells of densely populated communities	0 to 75,000 per 1 ccm.

Waller's table of the results of the analyses of the water of wells, two of them of fair quality and two much polluted, is also presented:

Well Waters.

(Results given in parts per 100,000.)

	Fair.		Polluted.	
	Faintly turbid; colorless.	Clear; light bluish.	Clear; light blue.	Turbid; yellowish.
Appearance	none.	slight.	sweetish.	foul.
Odor	0.527	0.877	15.114	24.103
Chlorine in chlorides	none.	none.	trace.	much.
Phosphoric acid in phosphates	0.091	0.252	11.53	4.035
Nitrogen in nitrates and nitrites	none.	none.	trace.	much.
Nitrites	none.	0.0004	0.0072	0.820
Free ammonia	0.004	none.	0.0022	-----
Albuminoid ammonia	0.0244	none.	0.028	0.265
Oxygen absorbed 15 minutes	0.0244	0.0054	0.028	0.337
Oxygen absorbed 3 hours	1.874	19.23	51.7	32.019
Hardness before boiling	1.106	3.72	39.2	30.935
Hardness after boiling	1.60	1.50	44.9	59.40
Organic and volatile matter	5.70	22.90	157.10	127.70
Mineral matter	7.30	24.40	202.00	187.10
Total solids on evaporation				

It is very evident that well water contains a larger amount of the chlorides, nitrogen in the form of nitrates and nitrites, also a larger amount of organic matter and germs, than springs and ordinary ground water. The respective amounts are largely influenced by the character of the soil, construction of the wells, and as regards the presence of germs, also by the temperature of the water and the use of the wells. It has been determined that cold water (about 40°), proper protection of the walls of the well, and constant use, furnish the least number of micro-organisms. This would indicate that they gain access, not so much from the ground water, as from the upper strata of the soil, and especially along the walls exposed to the action of the air. The chemical composition of the water would naturally influence the multiplication of germs, as they all require a proper pabulum for their development.

(b) *Drive wells* are made by driving an iron tube with a steel nozzle and perforations at its lower end, for the passage of water into the ground. They are rarely more than 30 feet in depth, and furnish a quality of water similar to that obtained from wells of like depth. They are, however, preferable, because the water is less liable to organic pollution, and if an impervious stratum intervenes between the surface of the soil and the ground water, a very pure quality may be obtained.

(c) *Deep wells* are generally not less than 100 feet in depth, and nowadays are usually made by boring (artesian wells) through regular geological strata. They pass through a superficial porous bed and an underlying impermeable stratum to reach water-bearing strata at greater depths. The water of deep wells usually travels a long distance, and the outcrop of the water-bearing strata on the surface may be many miles from the spot at which the well is sunk; but the position of the strata has an important influence on the quality of the water in relation to filtration from the surface. Dr. Waller has examined the wells of Manhattan Island, varying in depth from a few feet to 1,000 feet or more, and found that none of them "could be regarded as safe for household purposes. The strata on the island stand at angles varying from 80°

to 90° with the horizon, or nearly vertical, and as the tendency of the water is to follow the direction of the strata, a well sunk at one point, however deep, draws its supply from the water which has penetrated the surface not very far off, and in such a densely populated district all the water soaking through the ground becomes practically sewage, and is in the highest degree dangerous for use. London and Paris can sink their artesian wells and obtain wholesome water, since they are situated in geological basins, and the water from these wells has filtered into the water-bearing stratum from considerable distance outside of the city limits; but New York is not so favorably situated." A similar pollution may, of course, occur through rocks containing many fissures, even though they may be nearly horizontal formations. The reports from Rostock and Erlangen show that artesian water at a depth of 300 to 400 feet may be unfit for dietetic purposes. Generally speaking, the water supplied by deep wells is remarkably free from organic impurities; the chlorides, nitrates, nitrites, and CO₂ are present in diminished quantity, but chalk and magnesia are often in excess. The number of micro-organisms in artesian wells, according to Hueppe, is from 15 to 144 per 1 ccm., and water from chalk formations is usually free from germs. The temperature of artesian wells varies with their depth. The well at Grenelle is 1,800 feet deep, and yields 656 gallons of water per minute, with a temperature of about 80°.

5. MARSH WATER.

This water is ground and rain water, which stagnates in swampy sub-soil; it always contains a large amount of vegetable matter, sometimes as high as 12 to 40 grains per gallon. The mineral ingredients depend upon the character of the surroundings; calcium and sodium, in combination with carbonic and sulphuric acids, and chlorine, especially in salt marshes, are the most frequent. The water is unfit for drinking purposes, and the brackish water is especially favorable for the development of the germs of malarial fevers.

6. OCEAN WATER.

This water is especially rich in saline matter, the chlorides of sodium, and the chlorides and sulphates of magnesia; it contains very little ammonia, nitrates or nitrites. On account of the chlorides, water from wells near the sea is often quite brackish, although the organic matter may not be very large. At Landguard Fort, water from a boring 150 feet deep yielded more than 500 grains of solids and 380 grains of chlorides; the mean of six other samples was 165 of total solids and 35 of chlorides per gallon.

Summary.—From what has been said on the subject of wells, it is clear that they require special sanitary supervision. The depth of a well has less to do with the purity of the water supply than the prevention of surface and general soil pollution. In locating a well, it is necessary to carefully note: (1) Its position and depth in relation to cess-pools and other sources of pollution, the kitchen drain, barnyard, stables, cemeteries, manufactories, etc. (2) The character of the soil in which the well is sunk in reference to porosity; the lay of the underlying strata.

It would be obviously dangerous, as remarked by Waller, to place a well between a cesspool and the sloping margin of a stream, since the drainage naturally tends toward the stream bed. (3) The distance of a well from possible sources of pollution should be from 100 to 160 times the depression of the water in the well likely to be produced by pumping. All wells should be walled in, closed over, supplied with an iron pump, and protected by a coping to prevent contamination. The clear, sparkling, and palatable character of well water is no indication of its purity, and should not mislead us when the surroundings are suspicious. The River Pollution Commission advised the closing of all the wells in London except three, which were favorably placed; and Fanning considers the danger from contamination in towns where there may be a house every 100 feet very great; but everywhere, even in isolated farm houses, we should feel the necessity of constant attention to the water supply.

THE HYGIENIC IMPORTANCE OF WATER.

We have already referred to the fact that water is of prime necessity to man. It must be remembered that about 75 per cent of the human body consists of water, and the food proper to nourish one should contain about 81.5 per cent of water. "Solid food" contains, roughly speaking, from 50 to 80 per cent of water, and thus to make up the necessary amount of water, and to replace the loss eliminated by the kidneys, lungs, and skin, a certain quantity must be drunk in addition to the food. A healthy man weighing 154 pounds requires every twenty-four hours about $5\frac{1}{2}$ pints of water in some form or other. When the amount of water in the system is diminished by about 1 per cent of the whole, the sensation of thirst is felt, which we usually allay by imbibing the needful amount.

But like all good things, water may be used and abused; it may injure the system if taken in too large quantities, or if too hastily swallowed, or if taken too cold or too hot. If taken too freely, it will dilute the gastric secretions, and thus impair the digestive processes. Hasty drinking, especially if the water is too cold, may produce cardialgia, increased peristaltic action, colic, and, if swallowed when the body is overheated, acute gastric catarrh, and other mischief may result. Luke-warm water is liable to induce nausea, whilst hot water, instead of curing dyspepsia, is more apt to produce that disease, or cause inflammation of the gastric mucous membrane; warm water generally produces a feeling of agreeable warmth.

The degree of *hardness* of the water in relation to health is still a matter of dispute. It has been claimed that the presence of the salts of lime and magnesia may produce in some persons digestive derangements, and even lead to the formation of renal and vesicle calculi; but whilst this is not proven, we know that hard water is objectionable for culinary and washing purposes, and causes a great waste of soap. Very soft water is not free from objections, however, as it readily attacks lead.

Aëration of the water is of importance, since we all know how flat boiled and distilled waters taste. The carbonated waters are especially agreeable, and exert slightly stimulating properties upon the nerves of the digestive tract. Jaworsky, quoted by Uffelmann, claims that they favor the secretion of pepsin.

Ammonia, nitrates and nitrites, which are the oxidized residues of organic matters in the water, unless present in excess are not believed to be injurious to the system. Bartholow, Wood, and Hilgard tell us, however, that the daily introduction of ammonia into the stomach produces more or less irritation of the mucous membrane, and dyspepsia is almost sure to supervene. Circumstances may arise, therefore, to direct our attention to the estimation of ammonia in the water supply; the presence of nitrites is always suspicious.

The presence of *non-oxidized organic matter*, and of micro-parasites in the water, is of great importance to the sanitarian. If this matter is of vegetable origin, it is often quite harmless, unless present in considerable quantity. Organic matters of an animal or excrementitious character are dangerous, as well as disgusting. We have pointed out the various sources of vegetable matter in water, from swamps, forests, vegetation, and dust, and have spoken of the wastes of human life and occupations, cesspools, stables, slaughtering-houses, etc., as the most common sources of animal pollution. We also know that the atmosphere contains bacteria, many of which are the agents of decomposition, and select dead animal and vegetable matter, upon which they feed and proliferate, as their lurking places, and, clinging to such matter, often find their way into surface and other waters. When they are present in moderate numbers, under ordinary circumstances they are not at all harmful to the consumer of water, for the few thousand vegetable cells which we call bacteria may be just as harmless as a few hundred vegetable cells of larger size; but if the water has been derived from an impure source or becomes stagnant, the bacteria may proliferate in such large numbers as to produce serious disorders of the digestive tract. We do not know to what extent the ordinary harmless bacteria may be present before the water would become harmful, but the limit has been placed by Prudden at from 300 to 500 to the teaspoonful.

Now, whilst we know that diarrhœa, cholera morbus, and dysentery have been caused by water containing a large amount of organic matter, and in consequence also a large number of bacteria, it is not yet known whether the organic matter, or the bacteria, or the life products of bacteria, called ptomaines, produce the diseases spoken of, or whether they are invariably caused by the presence of a specific pathogenic germ. It would appear that ptomaines can induce intestinal catarrh, for Brieger has shown that the enteritis of Asiatic cholera is most likely caused by cadaverin and putrescin, and Vaughan regards tyrotoxicon, another ptomaine, as the cause of cholera infantum. The presence of these poisonous alkaloids has not yet been demonstrated in ordinary water, but there is much reason for believing that ptomaines are generated whenever the water is charged with decomposable organic matter and bacteria. On the other hand, we do know that certain disease-producing bacteria may be present in the drinking water. In fact, the specific micro-organisms of certain diseases which are often spread through the agency of water have been actually found in water and isolated.

In the first place, Meade, Bolton, and others have shown that the bacilli of typhoid and the coma bacilli may retain their vitality for a certain time in water especially rich in organic matter, and secondly, Koch found his cholera coma bacilli in a pond which supplied Calcutta with water, and they luxuriated particularly well in the suspended particles of organic matter. Mörs, Michael, Beumer, Chantemesse, Vidal,

and others have demonstrated the presence of typhoid bacilli in wells during the prevalence of enteric fever, and in addition to this we have such an array of epidemiological facts connecting the spread of typhoid fever and cholera with a contaminated water supply, that the advocates of the "germ theory" feel fully fortified in their position. Professor Pettenkofer and his adherents, however, reject the "drinking water theory," and maintain that the character of the soil, together with various conditions induced in it by meteorological changes ("telluric theory"), are the principal factors in the production of these diseases. We do not claim that a polluted water supply is the only possible means of spreading the infectious germs of these diseases, but there is sufficient evidence on record that not only the diseases already mentioned, but also diarrhoea, dysentery, malarial and yellow fevers, and diphtheria have been traced to contaminated drinking water.

Goitre appears to be due, in many instances, to the water used for drinking, but as yet we are completely in the dark as to the exact cause. Some attribute it to an excess of the earthy salts; others to compounds of bromine and fluorine, or to a deficiency of iodine; whilst Bircher attributes it to an alga, the *navicula*.

Entozoa.—There is no doubt that certain parasites, their embryos or eggs, gain access into the system through the water supply. They are: *Taenia solium*, *Bothriocephalus latus* (tape-worms), *Ascaris lumbricoides* (round worms), *Oxyuris vermicularis* (thread worms), *Filaria sanguinis hominis*, the embryos of which are sucked from the blood by mosquitoes, and then transferred to water, *Bilharzia haematobia*, *Distoma hepaticum* (liver fluke of sheep), and *Distoma ringeri*, believed to be the cause of endemic hæmoptysis in Eastern Asia, and finally the *Filaria dracunculus*, or guinea worm, which has been known to penetrate the subcutaneous tissues of bathers.

The possibility that parasites and disease germs may also gain access into the system during the washing of vegetables (like lettuce and radishes), fruits, and meats should not be overlooked, and many disease germs may be spread by the wash-water from infected clothing and persons, the cleaning of habitations, and the sprinkling of public highways.

Metallic poisoning may be caused by the waste waters of factories and metalliferous mines gaining access to the water supply, or by the absorption of metals from utensils, water pipes, and tanks. In the case of lead poisoning of Louis Phillips' family at Clairmont, seven tenths of a grain of lead was found in each gallon of water. Similar cases have been reported in France and Germany.

CHARACTERISTICS OF A GOOD WATER.

1. The water should be clear, colorless, and odorless, even when warmed.

2. A temperature between 45° and 60° is the most agreeable for drinking purposes. A lower temperature, such as the pernicious ice pitcher supplies, should be avoided.

3. It should be agreeable to the taste, having a slight pungency from the presence of oxygen or carbonic acid; but the palate cannot be depended upon, as water containing dangerous forms of animal matter is often pleasant enough to the taste.

4. It should be free from suspended matters, infectious germs, and even the suspicion of the presence of such germs.

5. It should be free from metallic contamination, and the degree of hardness should be small for cooking and drinking purposes; the extreme limit is set by some as high as 30 parts per 100,000.

The solids remaining on evaporation, according to Waller, should not exceed 50 parts per 100,000 (about 30 grains per gallon). Less than two parts of organic matter is regarded as admissible, but the quality of the organic impurity is much more important than the quantity.

The presence of phosphates in any marked quantity, unless properly accounted for, is indicative of animal pollution, and strongly suggestive of infectious matter. This is also true of chlorine in chlorides, if not accounted for by natural causes: 5 parts per 100,000 (3 grains per gallon) is the extreme limit assigned by some.

The amounts of ammonia and nitrates should be quite small, while nitrites should be entirely absent, although it does not necessarily follow that they are the products of harmful organic matter.

CLASSIFICATION OF WATERS.

As Regards Quality.—The English River Pollution Commission (6th Report) present the following classification of waters "with respect to wholesomeness, palatability, and general fitness for drinking and cooking:"

Wholesome.	{ Spring water.	{ Very palatable.
	{ Deep well water.	
Suspicious.	{ Upland surface water.	{ Moderately palatable.
	{ Stored rain water.	
Dangerous.	{ Surface water from cultivated land.	{ Palatable.
	{ River water to which sewage gains access.	
	{ Shallow well water.	

This classification is quite in accord with clinical facts.

As Regards Quantity.—The water supply must not only be of good quality, but also sufficient in quantity to meet the requirements of cleanliness of our bodies, clothing, homes, streets, and public resorts. Parkes estimates the average daily requirements per head as follows:

		Gallons per head daily.
Household.	{ Fluids as drink	0.33
	{ Cooking	0.75
	{ Personal ablution	5.00
	{ Utensil and house washing	3.00
	{ Clothes washing (laundry)	3.00
	{ Water-closets	5.00
Trade and manufacturing	.....	5.00
Municipal.	{ Cleansing streets	5.00
	{ Public baths and fountains	
	{ Flushing and cleansing sewers	
	{ Extinguishing fires	
Total	.....	27.08

A supply of 30 gallons daily per man would appear a sufficient amount for comfort and health. Provision must also be made for live stock, stables, etc. A horse requires about 16 gallons, a cow 10 gallons, and pigs about 5 gallons a day.

EXAMINATION OF WATER FOR SANITARY PURPOSES.

This may be accomplished by a *physical, microscopical, and biological examination*, and *chemical analysis* of the water. In our present state of knowledge, it is difficult to say which of these tests is of the greatest importance to the sanitarian, and whilst we may conclude that a bacteriological examination of the water will reveal the most important information, it is also true that one examination should supplement the other. As most of the examinations are made by experts, we shall present simply a brief schedule, and refer to the text-books for details.

I. *Taking Samples.*

In taking samples, it is of the utmost importance that it should be received in *perfectly clean* glass vessels; demijohns of 1 to 2 gallons capacity are the best. If the water is taken from a spring, pond, or river, the demijohn should be placed below the surface before it is filled; if the water is too shallow for this purpose, receive it in a smaller vessel and fill the demijohn from the latter. In drawing from pipes, a portion should be allowed to run to waste, in order to obtain an average supply. In towns, samples should be obtained direct from the mains, as well as from the houses. The bottle should be stopped with a glass stopper or a new clean cork, tied in and sealed, and transmitted at once to the analyst, duly labeled as to source of the water, the character of strata, character of the wells and springs, possibilities of impurities, meteorological conditions, droughts, excessive rainfall, prevailing diseases or the existence of any disease supposed to be connected with the water supply, and any remarks tending to show the reason for desiring an analysis.

II. *Physical Examination.*

1. *Color.*—The water should be examined in a two-foot clear white glass tube, standing on a white surface. The best samples are of a bluish or grayish tint; a greenish tint suggests vegetable contamination, whilst light brown or yellow colors are indicative of sewage contamination, but may also be due to peat, or the salts of iron.

2. *Clearness.*—The water in the glass tube or globe should be shaken. The purest waters are clear, bright, and sparkling, but this may also be the case in polluted, shallow well water.

3. *Odor.*—This is best determined by placing the water in a bottle with a narrow neck, and heating it to 104° or 112° F. Hydrogen sulphide, ammonia, and other gases of putrefaction may thus be recognized.

4. *Taste.*—This is an uncertain indication, and is largely influenced by the temperature of the water, and the presence or absence of gases. Iron may be tasted in very small quantities. Polluted or badly tasting waters should be rejected.

5. *Temperature* of the water can readily be determined by means of accurate thermometers placed in the original source, or in water after the amount contained in the house pipe has been allowed to run to waste.

Whilst the physical examination of the water affords no reliable evidence of its purity, it is of importance when no other examination can be made, or in connection with other methods.

III. *Chemical Analysis of Water.*

We have already, on p. 214, referred broadly to the limit at which certain constituents of water may be present without impairing the safety of a drinking water.

A qualitative examination of the solids dissolved in water alone is of no special value in judging the purity of a water, as the same constituents may exist in perfectly pure waters. It is far more important that we should know the amounts of each constituent in order to determine whether they are in excess or not. The chemist employs almost universally the French metric system in quantitative analysis, and the results are usually expressed as parts per 100,000, or as parts per million, which is the same thing as milligrammes per liter. [A liter of water is equal to 1,000 cubic centimeters, and each cubic centimeter of pure water at 4° C. weighs one gramme (= 1,000 milligrammes).] Results are also sometimes expressed as grains per gallon, but this is oftentimes misleading, especially when the report does not specify the gallon used: United States or imperial (English). The latter weighs 70,000 grains, and 70 cc. of water weigh 70,000 milligrammes; the quantity 70 cc. is a miniature gallon, and the results in milligrammes obtained by using 70 cc. may also be expressed as grains per gallon. If grains per gallon are multiplied by 10 and divided by 7, parts per 100,000 are obtained; parts per 100,000 may be converted into grains per gallon by multiplying by 7 and dividing by 10. The metric system should be adopted to the exclusion of all others.

1. *Determination of Total Solids.*—Evaporate 70 cc. of the water to dryness in a weighed platinum or porcelain dish, over a water bath, and weigh the residue thus obtained. This residue may then be heated to redness over a flame; the organic matter and volatile salts are driven off by the heat (note the loss of weight); the residue which remains consists entirely of mineral matters.

2. *Determination of Organic Matter.*—The above test for determining the amount of organic matter is altogether unreliable. Some of the organic matter may be lost on evaporation, or it may not be all driven off by ignition; again many of the mineral constituents may be decomposed with partial loss (carbonate of lime loses its carbonic acid and becomes quicklime); other mineral salts, as potassium chloride, may be partially or totally volatilized. Even the best methods of estimating the amount of organic matters only give approximate results; they are:

(a) *The Permanganate Process.*—Potassium permanganate dissolves readily in water and imparts a strong red-violet tint; it also parts with a large proportion of the oxygen it contains, affording colorless compounds in the presence of an acid. By this process, the oxidizable matters in water are determined in terms of the oxygen required for their oxidation. These matters include oxidizable organic matters, nitrites, ferrous salts, and sulphuretted hydrogen; the latter can be dispelled by heating the water, and the salts of iron may be tasted, but are generally disregarded.

To estimate, therefore, the oxidizable organic matters and nitrites, proceed as follows: Take 250 cc. of the water; add 3 cc. of sulphuric acid; drop in the permanganate solution (capable of yielding, in the

presence of an acid, 0.1 milligramme of oxygen for each cc.) from a burette until a pink color is established; warm the water up to 140° F. (60° C.) and drop in more permanganate solution; if the color disappears when the temperature reaches 140°, remove the lamp and continue the addition of the permanganate until the pink color is permanent for from ten to fifteen minutes. Then read off the number of cc. used; multiply by 0.1, to determine the milligrammes of oxygen required for the oxidation of oxidizable matters, and multiply by 4, to get the amount per liter. Example: 250 cc. of water with 3 cc. of sulphuric acid required 3.5 cc. of permanganate to give permanent color. $3.5 \times 0.1 \times 4 = 1.4$ milligramme of oxygen per liter required for total oxidizable matter, $1.4 \times 0.1 = 0.14$ per 100,000.

If the acidified water, as above given, is boiled for twenty minutes before adding the permanganate solution, the nitrous acid is driven off, and on cooling to 140° F., the oxidizable organic matter in terms of oxygen required for its oxidation may be determined. The nitrous acid in terms of oxygen required for its oxidation may be readily determined by calculation of the difference between the results of the two preceding processes. Each milligramme of oxygen represents 2.875 milligrammes of nitrous acid; we must, therefore, multiply the difference by this factor, and the result is nitrous acid in milligrammes per liter.

The permanganate process is simple and convenient, but is not entitled to implicit faith, for we do not know how much of the organic matter in a given specimen of water is oxidizable by an acid permanganate solution and how much is not. Nitrous acid is considered the first stage in the nitrification of organic matters and ammonia, and suggests, therefore, incomplete oxidation and possible danger.

(b) *The Albuminoid Ammonia Process* was proposed by Wanklyn and others, because of its simplicity: Add to the water remaining in the flask after the distillation of 150 cc. for the estimation of ammonia (free and saline), p. 218, 50 cc. of a strongly alkaline solution of permanganate, and continue the distillation, each 50 cc. of distillate having its ammonia estimated until no more comes over. The ammonia is the result of the action of the caustic permanganate solution at a boiling temperature on the nitrogenous organic matters (albuminous bodies, believed to be the favorable abode of disease germs); hence, this form of ammonia has been called albuminoid ammonia. Urea is not acted on by the solution, but this substance is not found in sewage, unless very fresh, and is never found in sewage-polluted water. All the free or saline ammonia must first be driven off by distillation before testing for "albuminoid ammonia."

(c) *The Organic Carbon and Organic Nitrogen Process* (Franklands). In this process the water is evaporated and the residue burnt with oxide of copper. Nitrogen and carbonic acid gases are set free from the organic matters and their volumes respectively measured and reported as "organic carbon" and "organic nitrogen." The ratio of carbon to nitrogen for animal matter is given as 3.1, and 8.1 for vegetable matter. Good drinking water should not contain over 0.2 part of organic carbon and 0.02 of organic nitrogen per 100,000 of the water. The combustion process requires elaborate apparatus and skilled hands.

In conclusion, the nitrate of silver methods of Leeds and Fleck may be referred to. Of all the tests referred to above, the permanganate process is as reliable as any; none of them are perfect, and none, as Uffel-

mann justly observes, can distinguish the harmless from the dangerous character of organic matter—a fact of great importance in judging the safety of the water.

3. *Determination of Ammonia.*—It is well known that urea, when it undergoes decomposition, is converted into carbonate of ammonia; hence, the ammoniacal odor of sewage. Ammonia will also be found in water polluted with sewage, unless the latter has percolated through a sufficient depth of soil to convert the ammonia by oxidation into nitrates and nitrites. Parkes tells us that a few pure deep-well waters from the chalk and greensand are found to contain excess of ammonia, but are otherwise free from organic matters, whilst sewage-polluted shallow wells not only contain an excess of ammonia, but also an excessive amount of organic matter.

To estimate ammonia, place 500 cc. of the water in a retort connected with a condenser, and distill off about 150 cc. The first 50 cc. contain usually three fourths of the entire amount of saline and free ammonia thus driven off, so that if the quantity of ammonia in the first 50 cc. is estimated, it is only necessary to add a third of this amount to obtain the whole quantity present in half a liter of the water; but the method of estimating the ammonia in each 50 cc. of distillate as it comes over is to be preferred: add 2 cc. of Nessler's solution to each 50 cc. of distillate, and compare on a white surface the yellow coloration produced with that obtained from a measured quantity of the standard ammonium chloride solution, each cc. of which contains 0.01 milligramme of ammonia. If the colors correspond after three to five minutes, read off the number of cc. of ammonium chloride used; allow for the portion of distillate not used; multiply by 0.01, and then by 4; the result is milligrammes of free ammonia per liter, or parts per million; dividing by 10 gives parts per 100,000.

4. *Determination of Nitrates and Nitrites.*—The presence of either or both of these compounds in water is suspicious, since they are the oxidized residues of nitrogenous or organic matter. Nitrates and nitrites are not found in fresh sewage, but are present in combination with lime, soda, potash, etc., in polluted streams and watercourses, and in the effluent subsoil waters from manured or sewaged land. When found in drinking water, they are generally the result of previous pollution either of the water itself or of the soil through which it flows, but we cannot tell when the pollution may have taken place, and for all we know contamination may still be going on. When found in deep wells or springs, their presence simply indicates complete purification of the water in its passage to the deep strata. This is wholly true of the nitrates; but if they are found in shallow wells in connection with nitrites (which represent the transition state between ammonia and albuminoid compounds and the nitrates), and also find an excess of chlorine and ammonia, we may justly regard it as evidence of sewage or animal contamination.

For the purpose of estimating the amount of *nitrates*, evaporate to dryness 10 cc. of the water in a small platinum dish. Add to this residue 3 cc. of a solution of sulphuric acid and phenol and two drops of pure hydrochloric acid, and then warm the dish for three minutes over the water bath. Pour the contents into a Nessler glass, and neutralize with caustic potash solution until effervescence ceases; then fill

up with distilled water to the 50 cc. mark, and compare the depth of the yellow color produced with that of a test solution containing one milligramme of nitrate of potash in each cubic centimeter, to which the same reagents have been added. This process of comparison by depth of coloration is known as "Nesslerizing." To express in terms of nitrogen as nitrates the result must be multiplied by 0.14 (Parkes). The indigo method of Marx Tromsdorff and the Tiemann chloride of iron method are commonly used in Germany.

For the direct determination of *nitrites* a solution of metaphenylenediamine is prepared, and also a dilute sulphuric acid, one part of strong sulphuric acid to two parts of water. One cc. of each solution is added to 100 cc. of the water, which is put in a Nessler glass; a red color is produced. Another glass is placed alongside, and into it is put as much of a standard solution of potassium nitrite as may be necessary, making up the bulk to 100 cc. with distilled water; then add 1 cc. each of the sulphuric acid and the metaphenylenediamine. The remainder of the process is carried on much in the same way as ordinary Nesslerizing. The standard potassium nitrite should be 1 cc. = 0.01 milligramme of NO_2 . The number of cc. used gives the milligrammes of NO_2 present in the sample of water.

5. *Determination of Chlorine.*—As already stated, water in certain localities may contain chlorides in excess. Rain water contains 0.5 per 100,000, and pure waters as high as 1.4 per 100,000. An increase beyond this, unless accounted for by salt-water strata or proximity to the ocean, is strongly indicative of animal pollution, since vegetable contamination may exist without appreciable increase of the chlorides. Sewage derives the chloride of sodium mostly from the urine it contains, and, because of the great solubility of the salt, it is not readily removed by filtration through the strata.

Place 100 cc. of the water to be examined in a white porcelain dish; add 1 cc. of potassium-mono-chromate solution (free from chlorine); drop in the standard silver nitrate from the burette, and stir after each addition; continue to drop until the chlorine, being all precipitated as silver chloride, a reddish color of silver chromate is just obtained. The nitrate of silver solution must be of a strength that 1 cc. will exactly neutralize one milligramme of chlorine. The number of cc. of silver solution used gives the parts of chlorine per 100,000 of water; to express it in grains per English gallon multiply by 0.7.

6. *Determination of Phosphoric Acid in Phosphates.*—The presence of phosphates is generally accepted as an indication of sewage contamination, and their determination furnishes, therefore, strong corroborative evidence. In some cases they may be derived from the rocks through which the water has passed. A qualitative examination usually suffices, but to be more exact proceed as follows:

The incinerated total residue of the solids is to be treated with a few drops of nitric acid, and the silica rendered insoluble by evaporation to dryness. The residue is then taken up with a few drops of dilute nitric acid; some water is added, and the solution is filtered, the filter having been washed with dilute nitric acid; 3 cc. of the filtrate is mixed with 3 cc. of molybdate of ammonia solution, gently warmed and set aside for fifteen minutes at a temperature of 80° . The result is reported

as "traces," "heavy traces," or "very heavy traces." The precipitate may be collected and weighed, after washing with the least quantity of distilled water, and then dissolved to neutrality in dilute ammonia. The solution thus obtained is evaporated with repeated additions of small quantities of water, and the residue is weighed. The weight divided by 28.6 indicates the amount of phosphoric anhydride; to express it in terms of PO_4 divide by 21.4 (Parkes).

7. *Determination of Hardness.*—The hardness of water may be due to salts of lime or magnesia, to volatile (CO_2) or fixed acid. To estimate the total hardness of water, place 70 cc. in a small stoppered bottle, and add the soap solution, shaking it strongly after each addition until a lather is formed which is permanent for five minutes. Then read off the number of cc. of the soap solution used. This solution is made of such a strength that 1 cc. is capable of exactly neutralizing 1 milligramme of carbonate of lime. The number of cc. of soap solution required to form a lather in the 70 cc. of water is the number of milligrammes of carbonate of lime in the 70 cc., or the number of grains per gallon; we should, however, deduct 1 cc., as that amount is required to give a lather in 70 cc. of the purest, even distilled, waters. In Dr. Clark's scale, 1 grain of calcium carbonate or other salts per gallon is called 1 degree of hardness. The permanent or fixed hardness can be determined by the same process with water which has been boiled for half an hour and allowed to cool to 60° , and as the difference between the total and the permanent hardness is the temporary or removable hardness, the result of the permanent hardness should be deducted from the total hardness. The hardness due to magnesian salts can be estimated separately with the soap solution after precipitating all the lime salts with oxalate of ammonia. The amount of permanent hardness is important, as it chiefly depends upon calcium sulphate and chloride and the magnesian salts; it should scarcely exceed 3° or 4° of Clark's scale. It may be due to sewage contamination, as sewage is especially high in permanent hardness.

8. *Determination of Metals.*—The addition of a drop of ammonium sulphide to some of the water in a porcelain dish will produce a dark coloration, even if only slight traces of iron, lead, or copper are present. If it is iron, the addition of a few drops of hydrochloric acid will cause the color to disappear, but the color remains if lead or copper is present. Whilst the presence of iron is of course harmless, water containing lead or copper should be rejected. In order to detect arsenic, large quantities of the water must be distilled and the residue subjected to Marsh's test.

IV. *Microscopical Examination of Water.*

The object of this examination is to determine the presence and character of foreign matter, mineral, animal, or vegetable, found in the sediment or floating in the water, and to see in how far they may be connected with the water pollution from sewage or domestic refuse matter.

Mineral particles are usually recognized by their crystalline or amorphous character.

Vegetable and animal matters, such as fibers of wool, cotton, linen, wood, starch cells, spiral threads of cabbage and other vegetables, macerated paper, human hairs, striped muscular fiber, and squamous

epithelium, suggest the contamination of the water with sewage, possibly with human refuse. The remains of animals of all kinds, such as wings and legs of insects, spiders and their webs, particles of the skin of aquatic animals, are not uncommon. In addition to this we usually find living organisms of a low type, such as bacteria (micrococci, bacilli, and vibriones), amœba, and infusoria. Many of these may be perfectly harmless; others have been recognized as pathogenic, and all suggest the presence of organic matter, on which they feed.

In water polluted with vegetable matters, we find fungi and molds, algæ, diatoms, desmids, and various confervæ. Among decaying vegetable matter will be found an abundance of micro-organisms, including bacteria, amœbæ, different species of englenæ, ciliated, free, and rapidly moving infusoria, such as kolpoda, paramœcia, coleps, stentor, keronæ, stylonychia, etc. The presence of the anguillulæ, or water worms, and rotifera, or wheel animalcules, is very common, and while of no special importance, they indicate a supply of organic food and, therefore, impurity of water. Then we have the entomotraca, such as the water flea, daphnia pulex, cyclops quadricornis, and others which occur in many good waters. The amphipoda, isopoda, and tardigrada (water bears) may be met, as well as the larvæ of the water gnat, skip-jack, and the pupa form of many insects may be found in pond water. The presence of entozoa, their embryos and eggs, has already been referred to on page 213. The sewage fungus (*Beggiatoa alba*) is found in waters containing an excess of the sulphates, derived either directly from sewage or from substances used in precipitating sewage or from waste water of manufactories. The fungus forms dense, flocculent, grayish-white masses attached to floating vegetation or to the banks of the stream. The microscope reveals an immense number of colorless threads containing bright, strongly refractive, globular particles of sulphur; the threads branch dichotomously (Parkes).

The foregoing list of microscopical objects is so large as to be confusing in attempts at identification and interpretation; it is well to remember that the lowest forms of organisms, like bacteria, amœbæ, fungi, ova, and ciliated infusoria, are strongly indicative of pollution and putrefactive changes.

Cohn tells us that diatoms, green algæ, and confervæ predominate in water containing a small amount of organic matter, and that they are rarely found in decomposing water; in the latter the infusoria, particularly the ciliated forms, the entomotraca, and wheel animalcules predominate. In waters rich in suspended organic matter, we find principally fungi, infusoria, carnivore, amœbæ, anguillulæ, and some wheel animalcules and tardigrada (water bears). In water containing a large amount of soluble organic matter, we find infusoria, flagellata, certain forms of amœbæ, ciliated infusoria, and bacteria.

Krapelin's studies of the fauna in the Hamburg water system are quite interesting. He found bryozoa, eels, snails, mussels, crabs, mollusks, worms, and all forms of the lowest animal organisms; also two species of marine animals: sea-crabs and platessa flesus. The air-breeding and vegetable-feeding animals were not found, but the aquatic animals supplied with gills, consumers of detritus, and aquatic animals of prey were largely represented. According to this author, the entire fauna in the water system is built up from the lowest forms of animal life, the higher species consuming the lower.

V. *Biological or Bacterioscopic Examination of the Water.*

The principal object of this examination is to determine the presence of pathogenic micro-parasites. The existence of harmless bacteria in water is of secondary importance, and is simply suggestive of danger, but not proof. We can infer from the number of bacteria found that the water is chemically good or bad, and in so far the counting of germs furnishes corroborative evidence of the presence of a larger or smaller amount of organic matter (ammonia, nitrates, or phosphates in the water, which constitute a suitable pabulum for these organisms).

We have seen, however, that certain pathogenic bacteria have been found in water, and it is quite possible that disease germs do not retain their vitality for any length of time in different qualities of water; it is also possible that they may be destroyed by other bacterial germs. In the bacteriological examination of water presumably contaminated with disease germs, it is therefore of the utmost importance that it shall proceed without delay, and in taking samples it is also desirable to procure them from different depths and place them in sterilized flasks, properly secured. The examination may then proceed as follows: "A measured quantity of the water—1 cc. or a fraction of 1 cc.—is mixed with a test tube full of liquefied, sterilized, nutrient gelatine, a portion of which is then poured on a glass plate and placed under a bell jar, with suitable precautions to prevent the entrance of atmospheric spores. After a few days the germs or spores are found to have developed into recognizable colonies, which may be counted and differentiated by their color, their mode of growth, the liquefaction they produce in the gelatine, and other characteristics. Under the microscope, the colonies may be separated into the different varieties of bacteria, molds, and fungi, and each colony may subsequently be submitted to cultivation in test-tubes of gelatine, agar-agar, blood serum, etc." (Parkes). This last suggestion is especially important. If we find varieties of bacteria which are not common in water, and possibly of a pathogenic character, after obtaining pure cultivations through successive generations, they should be inoculated into animals, to determine whether they are reproduced. For the simple recognition of bacteria it may suffice to put a few drops of the water on a clean glass slide placed on a piece of filtering paper under a bell jar. Let it evaporate, and draw the slide three times in succession through a gas flame; stain with a solution of gentian violet, and examine by means of a high power microscope. The stained bacteria will thus be readily recognized.

PURIFICATION OF WATER.

Sufficient evidence has been adduced to indicate the necessity of freeing the water supply as far as possible from foreign and contaminating ingredients, and this may, to a certain extent at least, be attained by the various methods recommended for the improvement of water.

Boiling.—This is an old remedy for rendering hard water soft. It liberates the carbonic acid, and thus renders the lime and mineral matters, except alkalis, which exist as carbonates, insoluble; the resulting deposit at the bottom also carries with it more or less organic impurity. Another important object of boiling, for at least thirty minutes, is the

destruction of all the minute organisms, and which may include disease germs. Boiled water has lost its pungent, pleasant taste, and should be subjected to the rough aëration, which may be done by shaking, or pouring it back and forth through the air a few times. Hard water may also be softened by Clark's process, which consists in the addition of lime water, causing a precipitate of carbonate of lime. Nine ounces of quicklime will be sufficient for 400 gallons of water, provided the hardness does not exceed 30°. The addition of a little carbonate of soda (washing soda) will accomplish the same purpose.

Distillation effects even a more complete purification of water than boiling. The first portions of the distillate containing generally volatile substances should of course be rejected. Distilled, like boiled, water tastes flat, and should be aërated, as suggested above, or by allowing the water to flow through sprinklers. Distillation of sea water is carried on all ocean steamers.

Freezing liberates the salts of sea water and destroys a large number of bacteria, but there is sufficient evidence to show that certain disease germs retain their vitality in ice for some time, and that freezing cannot be depended upon for the purification of water polluted with organic matter.

Addition of Chemicals.—The addition of various chemicals to the water, for the purpose of hastening clarification by deposition, has been recommended by various authors. Of these the principal are: alum, perchloride of iron, sodium carbonate, and potassium permanganate. Hager recommends tannin for the destruction of algæ, and Langfeldt extols citric acid for the same purpose. Whilst all these substances cause a precipitate, the same may be accomplished by allowing the water to settle; they have but little effect in purifying a foul water, or in destroying micro-organisms, and as none except the citric acid improve the taste of the water, we possess, in boiling, a far better remedy.

Filtration.—The principal effect of filtration is the removal of the suspended matter in the water. In addition, however, filters, according to the material used, may eliminate some of the dissolved matters; this, of course, depends upon the size of the pores, the pressure, and abstractive qualities of the filter. The principal materials used in the construction of filters are: vegetable and animal charcoal, sand and other porous stones, wool, cotton wool, glass wool, felt, iron sponge, asbestos cloth, porous burned clay.

Charcoal and bone-black, when properly prepared and fresh, certainly have the power of removing all of the suspended matter and a considerable quantity of micro-organisms and dissolved matter, both mineral and organic. According to Knapp, *vegetable charcoal* removes 52.8 per cent of the total solids, 88 per cent of organic matter, and 23.8 per cent of the salts, whilst *animal charcoal*, when fresh, according to Uffelmann, removes 67 per cent of the total solids, 89.2 per cent of organic matter, 24.1 per cent of the salts, and 80 per cent of the micro-parasites. The good effects, however, do not last longer than a few days. The eliminating power for microbes ceases very soon, and it becomes neces-

sary to regenerate it by exposure to heat. If this is not done the filtered water may show more microbes than the original supply.

Sand, especially sharp, angular, white sand grains not exceeding 1.5 mm. in thickness, affords an excellent material for the elimination of suspended impurities. Sand also removes a certain amount of soluble organic matter, and assists in their oxidation. Uffelmann's experiments with a sand filter 1 meter deep show a removal of 38 per cent of oxidizable matter, 4.2 per cent of chlorine, 3.4 per cent of lime, 70 to 80 per cent of micro-parasites; in Hulna's experiments there was a removal of 26.2 per cent of oxidizable matter, 33.6 per cent of ammonia, 50.2 per cent of albuminoid ammonia, 1.6 per cent of chlorine, 9.8 per cent of lime, 20.54 per cent of the total solids.

Sand and gravel are used on a large scale in reservoirs for the purification of water. The water having first been received into settling reservoirs, where the bulky substances subside, is passed over the filter-beds, which consist of, first, layers of fine sand 2 to 3 feet deep, next a 4-inch layer of coarse sand, next below a similar depth of small gravel, next a 6-inch layer of gravel the size of walnuts, and at the bottom a 1½-foot layer of cobblestones the size of apples. In the lower layer are the mouths of the outlet pipes, which convey the water to the pumping stations. Usually the depth of water on filter-beds is scarcely over two feet, and as the upper fine layer of sand catches most of the impurities, it is liable to become choked, and must be frequently removed and washed with the water jetted from a hose under high pressure. By means of such filters, Dr. Frankland tells us that 90 to 99 per cent of micro-organisms are removed from the London waterworks.

Spongy iron, or porous metallic iron, obtained by roasting hematite iron ore, is used for the same purpose in London, Antwerp, and other cities. The fact that iron yields nothing injurious to water, and can be used for a considerable length of time without great deterioration, have been its strongest recommendation, but Pfarre found that the filtrated water is by no means free from micro-organisms, and the iron taste is, moreover, so objectionable that Antwerp subjects its water supply to an additional filtration through sand.

Domestic Filters.—It has been truly said that they are probably more often a source of pollution of the water than otherwise, for the simple reason that no attention is paid to the removal and cleansing of the filtering material; in consequence, its pores become clogged with putrescible organic matter, which favors the multiplication of bacteria, and it is not at all infrequent to find that the filtrate under such circumstances contains more bacteria than the unfiltered water. It should be understood that, in spite of advertisements, there is no such a thing as a "self-cleaning filter," and persons who neglect the cleaning had better do without filters altogether. They should be attended to at least once in ten days, and after thorough flushing with hose, the charcoal must be heated to redness under cover, in order to destroy the organic matter. From what has been said, no filter affords absolute freedom from microbes. This is not only true of the materials already referred to, but also of *caferal* (a mixture of iron, charcoal, and clay), *wool*, *felt*, and *sponge*. It is claimed, however, that *glass wool*, *asbestos cloth*, and *unglazed burned earthenware* will remove all germs; there is no doubt that finely spun and pulverized glass wool, or asbestos pressed firmly into a cylinder, will

accomplish this purpose for a time at least. "Breyer's microbe-membrane filter" is made on this principle, but Uffelmann's experiments have shown that whilst this filter is capable of entirely freeing of germs 100 liters of water per day for six days, after that time the number of microbes in the filtrate increased from day to day.

The "Pasteur-Chamberland filter" is made of five or six solid, porous, earthenware cylinders, surrounded with a metallic case, which is screwed on to the faucet, and the water is forced through the pores of the earthenware cylinders, and appears perfectly free from all suspended matter, and for a few days also free from bacteria and their spores. As it acts purely mechanically there is no alteration in the chemical composition of the water; but Uffelmann claims that even this filter loses its eliminating power for micro-organisms after five to six days' use.

According to Parkes the essentials of a good filter are:

(1) That every part of the filter shall be easily got at for the purpose of cleaning or renewing the medium.

(2) That the medium have a sufficiently purifying power and be present in sufficient quantity.

(3) That the medium yield to the water nothing that may favor the growth of low forms of life.

(4) That the purifying power be reasonably lasting.

(5) That in the construction of the filter itself there shall be nothing capable of undergoing putrefaction or of yielding metallic or other impurities to the water.

(6) That the filtering material shall not be able to clog, and that the delivery of the water shall be reasonably rapid.

We may add that the most important object of a filter is the elimination of pathogenic bacteria, and, in order to do this effectually, filters must receive greater attention as regards cleansing and renewal than they have heretofore. It is perfectly evident that filters formed of loose particles, which give a more rapid delivery of water than finer materials, cannot be depended upon for the elimination of germs. Whilst the sand filters render the most effective service for the purification of water on a large scale, and the asbestos filter of Breyer and the Pasteur-Chamberland filter for domestic use, yet the English River Pollution Commission is doubtless correct in declaring that all the methods of purification by filtration have so far been inadequate to prevent the propagation of epidemic diseases by water. We may also fully indorse their concluding opinion, that "nothing short of abandonment of the inexpressibly nasty habit of mixing human excrement with our drinking water can confer upon us immunity from the propagation of epidemics through the medium of potable water."

When we consider how very minute the specific bacteria really are, we need not wonder that they can readily pass through the filters of nature and the filters of man, without any effort of squeezing. In the epidemic of typhoid fever at Laussen, it was shown that specifically infected water had passed under ground for a half mile and contaminated a spring. In this instance the proof was made by a solution of chloride of sodium, and afterwards flour; the saline mixture found its way into the spring, but not the starch, all of which indicates that whilst filtration prevented the passage of finely ground flour previously mixed with water, it was not capable of removing the specific germs of the disease.

In our present state of knowledge, it would appear that nothing short

of boiling or distillation can be relied upon to render polluted water harmless, and a good plan in the household is to boil the water first and then pass it through an aërating process; even simple agitation of boiled water will improve the taste, or in the absence of a more elaborate process, the air can be introduced by a bellows.

DISTRIBUTION OF WATER.

In our discussion of rain water, springs, lakes, streams, rivers, and wells, we have dwelt with sufficient length upon the various sources of collection, and also disposed, so far as rain water is concerned, of the subject of storage in cisterns, tanks, etc. The question of storage and distribution in city waterworks needs our attention for a few minutes.

The amount of storage required naturally depends upon the amount of water used and the facilities for replenishing it. We can readily calculate the space required when these conditions are obtained, namely: the number of gallons required daily for the whole population must be divided by 6.23 to bring into cubic feet, and multiplied by the number of days which the storage must last; the product is the necessary size of the reservoir in cubic feet (Parkes). Reservoirs are usually divided into receiving and distributing reservoirs. In the former, the water having been pumped in, or conducted from natural channels, is permitted to settle, depositing more or less of its suspended impurities; the water is then passed over the filter-beds to the high or distributing stations. It is needless to reiterate here that whatever the size of reservoirs, they should be kept scrupulously clean and free from all sources of contamination; they should be covered, well ventilated, and rather deep, for the purpose of lessening evaporation and securing coolness. It is an open question whether, in the periodical cleaning of reservoirs, it is wise to disturb water-plants which grow in them, as some, like the *protococcus* and the *clare*, give out a certain amount of oxygen, and thus aid in the rapid oxidation of objectionable organic matter. Other plants, like the duckweed and some of the *nostoc* family, give rise to disagreeable odor and taste. In all cases of doubt it is best to remove some of the plants, place them in pure water, and determine whether they increase the amount of organic matter in water. When the houses are removed from sources of water, the supply should be conveyed in aqueducts and pipes; any other method is crude and objectionable. We have already referred to the colossal aqueducts of ancient Rome, and it may be well to mention that the modern city of Rome is to-day the best supplied city as regards water in the world. This has been accomplished by a thorough renovation of the ancient *Agua Marcia*, *Agua Felice*, *Agua Vergine*, and *Agua Paola*, which together supply not less than 3,000 liters, or about 800 gallons, per head, daily.

The public in towns and cities of this country is now very generally supplied by well-regulated water companies. The supply for villages, isolated houses, and farms has been discussed in connection with wells, springs, etc.

The water from public works in the United States is distributed from the reservoirs by means of iron pipes. As iron pipes are liable to rust, and to clog from accumulated rust, not to mention the absolute corrosion, the interior of the pipes should be coated with hot pitch, tar, or vitreous glass. The magnetic oxide of iron produced on the surface of

the metal by "Barff's process" is also employed. The practice of calking the joints with tow or gaskin next the interior of the pipe, and then running the joint with molten lead, is no longer tolerated; the pipes are screwed together, and in the case of mains large enough for a man to enter, the inside of the joint should be pointed with Portland cement.

The amount of leakage is great enough, without carelessness. Leakage often takes place from uneven settling of the ground after laying the pipes, or from the vibration of heavy traffic, causing fracture of the pipes and joints. Parkes tells us that in London fifteen gallons out of the thirty-five supplied per head daily thus run to waste in the soil. The amount of waste is, of course, greatly influenced by the pressure. For the purpose of detecting such leakages, meters have been designed, which are placed on each district main; they register the flow by day and night, and as very little water is consumed during the night season, it can be safely concluded that the amount registered, or at least the greater portion of it, is running to waste. The exact spots where the leakages are taking place can be determined by the vibrations produced thereby in the nearest house-communication pipes, which can be distinctly heard by applying the ear to the pipe, and frequently without doing so.

The house-communication pipes are generally of lead. Hygiene cannot approve of their employment, for they are liable to be acted upon, especially by soft water, and in consequence there may be danger of lead poisoning to the consumer. On the other hand, it is claimed that hard waters containing salts of lime and magnesia, either have very little solvent action on lead, or they quickly coat the metal with sulphate or basic carbonate of lead, which prevents further action. Odling suggests that whilst new lead pipes are acted on by soft waters, forming a soluble oxide of lead, this ceases after awhile, owing to a coating of carbonate of lead, the only exception being waters which are quite free from silica or its compounds. In the water supply of Glasgow, from Loch Katrine, it would appear that there is a deposit of peaty or vegetable matter, which prevents all further action of the water upon the metal, though the original water acts most powerfully upon lead.

Other observers claim that the soft, highly oxygenated waters, and those containing organic matters, nitrites, nitrates, and chlorides, are those which have the most solvent action on lead. In our present state of knowledge, it is simply fair to state that hard waters have little or no solvent action on lead, whilst soft waters are liable to do so, especially soft oxygenated waters derived from an intermittent service. We are not prepared to deny or admit that the action of soft water ceases on lead after a few weeks, or whether free carbonic acid favors plumbo-solvent action or not, neither can we explain at present the rôle which nitrates and chlorides play in this matter. The Sixth International Congress for Hygiene condemned the use of leaden pipes, and also imperfectly-tinned leaden pipes. Where lead poisoning is feared, a block-tin pipe should be substituted for the lead pipe, and if this is not done, the water in the house pipes should be run to waste every morning.

The supply of water to houses has been conducted on two systems, the *intermittent* and the *constant* service; which simply means that in the former the flow of water in the mains is stopped, except for a few hours every day, requiring, therefore, provisions for the storage of water on the premises of the consumer, whilst in the constant service, the mains being

always turned on, no storage facilities are required, except small tanks for the flushing of water-closets. When we remember the various causes liable to contaminate the water stored in cisterns, tanks, barrels, buckets, etc., it needs no argument to condemn the intermittent supply. Even if it could be tolerated in well-regulated houses, think of this service in the homes of the poor, the tenement houses of great cities, where the water is often stored in the most filthy receptacles. Fortunately for Americans, we have a better water service than England and some continental countries. The constant service is being rapidly introduced into English towns; over one hundred and fifty towns and the greater part of East London are now provided with a constant service, and the results have been especially beneficial to the poorer classes. Such a service, to be of real merit, must of course deliver sufficient water at all times, and not merely delude us with the name.

All the leaden service pipes of a house should be strong (12 pounds per yard for 1-inch pipes and 6 pounds per yard for $\frac{1}{2}$ -inch pipes) in order to withstand the constant pressure. If this pressure is maintained in the mains by pumping, and not by high level reservoirs, greater power must be used in the morning, as the greatest quantity is consumed at that time.

In this connection it is well to refer to the fact that when water mains and sewers are laid in the same trench, there is a possibility of foul matters which have escaped from leaky sewers being sucked into the water mains during intermissions in the service. The remedy is obvious: the water and sewage systems should be kept apart as far as possible.

ICE AND ARTIFICIAL CARBONATED WATERS.

Before dismissing this subject, it is proper to refer to the matter of ice, which plays such an important rôle in American households. The "pernicious ice-water pitcher" of Dr. Hammond is not only objectionable because of the bad effect of a low temperature on our digestive organs, but also because of the impurities likely to be contained in the ice. I have seen, time and time again, persons of intelligence use nothing but melted ice, with the firm belief that they were taking the purest of water, forgetting entirely that whilst some of the organisms are destroyed, others retain their vitality, and that, broadly speaking, freezing does not eliminate the organic impurities. The fact is that ice obtained from "a pond or river which is unfit as a water supply, is equally unfit for use." Ice water should contain no perceptible suspended matter, very little dissolved matter or chlorine, and the albuminoid ammonia should not exceed 0.005 part per 100,000.

The number of micro-organisms found in ice depends first upon the purity of the original water, and secondly upon the length of time the ice has been kept. This has been demonstrated by various investigators. Neger found that 1 cc. of river ice, frozen January 4, 1887, contained 440 germs. He examined 3 days later and found 273 germs per 1 cc.; after 6 days, 180 germs per 1 cc.; after 9 days, 40 germs per 1 cc.; after 13 days, 6 germs per 1 cc.; after 15 days, 2 germs per 1 cc.; after 20 days, 4 germs per 1 cc. Prudden's interesting experiments (Med. Record, March 26, 1887) show that 1 cc. of water contained 6,300 germs of the *Micrococcus prodigiosus*. He subjected this water to freezing, and found that the ice contained after 4 days, 2,970 germs; after 37 days, 22

germs; after 51 days, 0 germs. The results with water containing the germs of *Proteus vulgaris*, and another sample containing the bacilli of typhoid, were even more striking. All of which emphatically indicates that the presence of bacteria in ice depends largely upon the length of time the ice has been frozen. There can be no question as to the comparative purity of artificial ice manufactured from distilled water, in which Fränkel only found from 0 to 14 germs, and Uffelmann from 0 to 22 per 1 cc.

Now, whilst it is true that so far no pathogenic bacteria have been found in ice, their presence is at least possible if contained in the water previous to its freezing. Prudden kept the ice frozen from water containing typhoid bacilli for 103 days, and at the expiration still found 7,300 per 1 cc. Neger has shown that the bacilli of anthrax retain their vitality in ice for 14 days, and Friedlander's pneumonia cocci about a week. These observations are certainly suggestive of danger from impure ice, and for this reason preference should be given to artificial ice made from distilled water. In this connection I may relate an amusing incident of my frontier life. Last summer I visited almost every evening the family of a professional friend. About 9 o'clock regularly the punch or lemonade bowl appeared. I invariably declined the tempting beverage because the ice supply was obtained from a polluted ice pond. After the refreshments each of the three adults, my good friend the doctor included, would take one or two five-grain capsules of quinine, as they "all had symptoms of malaria." I finally suggested that the organic impurities contained in the ice might possibly produce the symptoms complained of, and they contented themselves thereafter with cooling the beverages by setting them on the ice. The symptoms of malaria soon disappeared.

Carbonated Water.—We have already seen that water rich in carbon dioxide is especially pleasant to the taste, and exerts a good effect on the digestive functions. These waters are either natural or artificial, and as they are largely consumed for medicinal and dietetic purposes, it is proper to present here the results of studies made in reference to the amount of carbon dioxide, and the number of micro-organisms contained in such waters. The natural carbonated waters contain between 200 and 2,000 cc. of free CO_2 per liter. No examination has been made to determine the number of germs in natural carbonated water, but Leone found in freshly prepared artificial water, 186 germs per 1 cc.; after 5 days, only 87 germs; after 10 days, 30 germs; after 15 days, 20 germs. This author attributes the disappearance entirely to the fatal effects of CO_2 on the microbes. Sohnke observed a similar diminution, especially when the bottles were supplied with patent stoppers, whilst ordinary corks afforded no such results. Hochstetter, quoted by Uffelmann, however found that samples of artificial seltzer water contained from 10 to 75,000 germs per 1 cc. when taken from bottles with patent stoppers, and even more when taken from bottles with common corks. He also found that the number of micro-organisms increased rather than diminished by keeping. In his experiments, conducted in the Imperial Health Office at Berlin, he demonstrated that the bacilli of septicæmia, cholera, and anthrax survived in this water but a few hours, whilst the bacilli of typhoid retained their vitality for days and

weeks, and the spores of the bacilli of anthrax showed no loss of vitality after several months.

Hellwig reports an outbreak of enteric fever in 1884, in the city of Mayence, Germany, which affected only persons who had been drinking artificial seltzer water from a certain establishment. Investigation revealed the fact that the water used was taken from a well notoriously impure and polluted with sewage from a cesspool which had received the evacuations of a typhoid patient. Whilst there was no bacteriological proof that the water contained the bacilli, it is highly probable that the germs of typhoid were transmitted in the artificial mineral water prepared from this infected source.

For this and the additional reason, that carbonic acid naturally favors putrefaction of organic matter, it is certainly high time that these artificial carbonated waters should be prepared from distilled water.

PROCEEDINGS

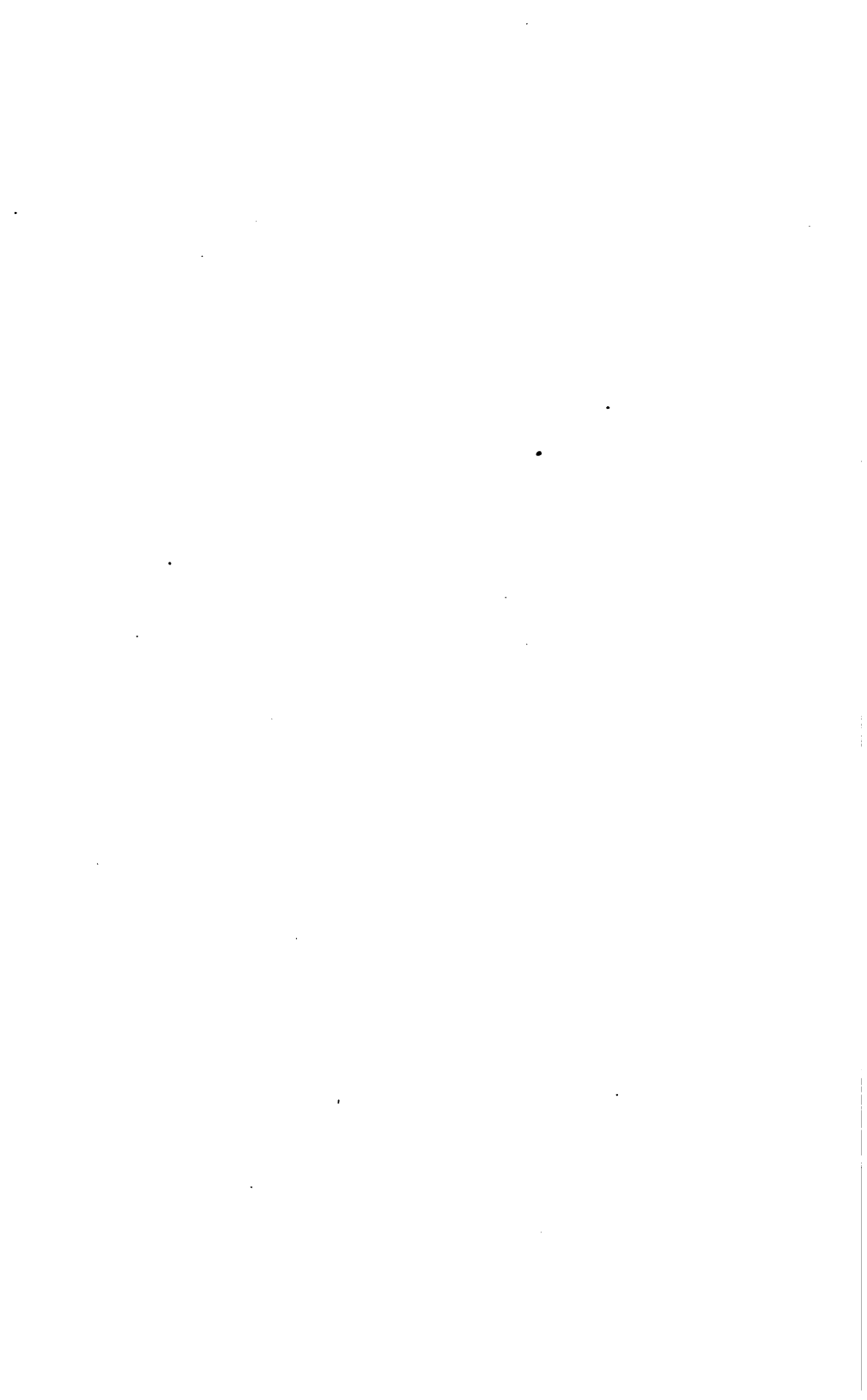
OF THE

SECOND ANNUAL SANITARY CONVENTION

OF

CALIFORNIA.

HELD AT SAN JOSÉ, UNDER THE AUSPICES OF THE STATE BOARD OF
HEALTH, APRIL 16, 1894.



STATE SANITARY CONVENTION.

The Second Annual Sanitary Convention, held under the auspices of the California State Board of Health, met in Germania Hall, San José, on Monday, April 16, 1894, and was called to order by Dr. H. S. Orme, of Los Angeles, Past President, the proceedings being opened with prayer by Rev. R. S. Cantine, of San José.

The President then introduced Hon. H. E. Schilling, Mayor of San José, who delivered the following address of welcome:

MR. CHAIRMAN, LADIES AND GENTLEMEN: It is with the greatest pleasure that I have the pleasant duty to perform to-day of extending to the members of the State Sanitary Convention and the State Board of Health of California an earnest welcome, in the name of the people of San José. Coming as our visitors do from the different localities of the State of California, and representing the organization formed for the promotion of health, and thereby happiness—the two great pursuits of the human mind—I can assure them of the earnestness of their welcome, without any thought other than that of honor and friendship for them and their business in behalf of the people of our State. Again, ladies and gentlemen, I extend to you the most earnest welcome in the name of our city, and I hope that there may be naught but pleasant recollections of your stay amongst us. [Applause.]

President Orme responded: We thank the Mayor for this kind and hearty welcome, and it again becomes my privilege to inaugurate another session of this our Sanitary Convention, so auspiciously begun one year ago. In this interval we are to be congratulated that the threatened visitation of cholera, which was then the chief ground of apprehension, has been happily averted, and we have been spared the trouble of meeting the invader at our borders. We are not to conclude, however, that the preparation made to face the emergency has been useless. Our Government maintains an army and navy to repel the invasions of enemies who are far less likely to come than is cholera, and these forces keep up a constant exercise of their maneuvers so as to be always prepared for emergencies, which is more than our health authorities have felt warranted in doing.

While we have escaped the more dreaded pestilences, cholera and smallpox, we have not been able to suppress la grippe, or influenza, which has for four years held its ground among us, and has shortened the lives of thousands. Though less rapidly fatal than cholera, and therefore less alarming, it has probably caused more deaths than the last visitation of cholera, which reached this country in 1873. How to control this distemper, which is fairly to be presumed to be produced by a peculiar microbe, like that causing cholera and the infectious fevers, is a problem that confronts both curative and preventive medicine. Surely our four years' experience has not taught us how to avert it, and hardly improved our means successfully to withstand it.

Another problem, and one which may chiefly, and I trust hopefully, be considered at this meeting, is the repression of tubercular diseases. They are now fully recognized as infectious; their mode of communication is fully understood; their method of prevention is no secret. Our duty lies in prevention, and our proceedings should be on the line of educating the public, and awakening a general effort to avoid and prevent practices that tend to the dissemination of the germs of disease through our common atmosphere, and prevent their admission to our daily food and drink.

And now I must not fail to acknowledge my sense of the high honor conferred upon me at the inauguration of this session, of presiding over its deliberations, and I now have the pleasure of asking you to nominate my successor, who will preside over this meeting. [Applause.]

Dr. William H. Mays, of San Francisco, nominated Dr. C. A. Ruggles, of Stockton, whom he styled one of the foremost and most enthusiastic workers in sanitary science in the State, one who had for years devoted nearly all his time and attention to preventive medicine and sanitary science, who had for years been the chief Health Officer of Stockton, and by his efforts had revolutionized the sanitary condition of that city.

Dr. Winslow Anderson, of San Francisco, seconded the nomination, and on his motion the nominations were declared closed, and Dr. Ruggles' election declared unanimous.

The organization was completed by the election of Dr. J. H. Carothers, of Martinez, First Vice-President; Dr. J. R. Curnow, of San José, Second Vice-President; Dr. Winslow Anderson, Secretary.

Dr. C. A. Ruggles, the President elect, then delivered his address.

On motion of Dr. Winslow Anderson, a committee of three was appointed on publication. The Chair named as such committee Drs. J. R. Laine and W. F. Wiard, of Sacramento, and Dr. Winslow Anderson.

Dr. George C. MacDonald, of Sausalito, read a paper on "Contagious Diseases; their Suppression by Legal Measures," which was referred to the Committee on Publication.

Dr. J. H. Stallard, of San Francisco, followed with an elaborate paper on the "Ultimate Disposal of Sewage, with Spécial Reference to San Francisco."

Dr. Alfred E. Regensburger, of San Francisco, next held the floor with a vigorous paper on "Cremation."

The doctor introduced the resolutions concluding his paper, which were seconded by Dr. Orme, and, on the suggestion of the Chair, the discussion of them was deferred until evening.

Dr. H. S. Orme, of Los Angeles, Past President of the State Board of Health, then read a paper on "Sewage Irrigation."

Dr. J. H. Davisson, of Los Angeles, a member of the State Board of Health, presented a paper on "Sanitation of Dwellings, Public Buildings, and Thoroughfares."

Following this came Dr. Walter Lindley, Superintendent of the Whittier State School, Whittier, with a paper entitled "Indio; The Colorado Desert as a Health Resort."

Dr. Cephas L. Bard, President of the Southern California Medical Society, and Health Officer of Ventura, read an elaborate paper detailing "The Ravages of the Bacillus Anthracis in California."

Dr. Orme spoke as follows: As the President of this convention in

his address has alluded to the subject of school hygiene, I would say that at the last meeting of the State Medical Society a special committee was appointed for the purpose of urging upon the public school authorities in the State of California the importance of betterment in the teaching of physiology and hygiene in our public schools. As a member of the committee I am sorry to say that we have labored with but indifferent success; still we do not despair. In view of the importance of a better knowledge of the principles which underlie the preservation of health to the rising generation, I venture the opinion that the subject is appropriate for the consideration of this convention, and therefore move its reference to a special committee, with instructions to report at the evening session of the present meeting.

The suggestion was adopted, and the Chair named as the committee Drs. Stallard, Anderson, and Franklin.

A recess was then taken until 7 o'clock in the evening.

EVENING SESSION.

The proceedings opened with a paper by H. A. Spencer, V.S., of San José, on "Sanitary Legislation," which was referred to the Committee on Publication.

C. B. Orvis, D.V.S., of Stockton, followed with a paper on "Glanders, and the use of Mallein as a Diagnostic Agent." The President, Dr. Ruggles, prefaced the paper with the statement: A great disappointment is mine in connection with this matter. I had made arrangements with Dr. Orvis that the cattle at the State Asylum should be subjected to diagnostic tests for tuberculosis. I have communicated with the Bureau of Animal Industry at Washington for the purpose of getting a reliable article of tuberculin, thinking that the tuberculin would arrive so that we could make a report to you to-night after using it. It has not arrived, but I assure you that as soon as the article does arrive these experiments will be conducted by the State Board of Health, with the assistance of Dr. Orvis, and a printed report of it will be made and furnished to the medical journals. [For tests, see pp. 183-187 of this report.]

"Sanitation from the Standpoint of a Plumbing Inspector," by W. W. Oates, Plumbing Inspector, Stockton, was the next paper presented.

Dr. J. R. Laine, of Sacramento, offered the following:

Resolved, That hereafter consumption and other diseases due to the bacillus tuberculosis should be included in the list of diseases dangerous to public health, requiring notice by householders and physicians to the local Health Officer as soon as such disease is recognized.

In explanation and support of the resolution Dr. Laine said: My reason for introducing a resolution of this character at this time is in order that it may be considered in connection with the papers read and to be read on the subject, and a thorough discussion had. I believe that while the majority of people will not dispute the contagiousness of tuberculosis, yet there must be an agreement on the part of the profession that there is danger from this cause, and if there be an announcement by a body of this character, it can then go forth to the people as the views of the profession, and they may accept it as fact. I move the adoption of the resolution, but I believe it would be proper to first read

the papers on the subject and then discuss the resolution on its merits.

This course was decided upon, and Dr. W. F. Wiard followed with a very able paper on "The Prevention of Consumption."

Dr. S. S. Herrick, of San Francisco, read a paper on "The Prevention of Tubercular Diseases."

Then, on the suggestion of the Chair, in order to have a change of thought, Dr. William F. McNutt, of San Francisco, was invited to read a paper prepared by him, entitled "Cremation; the Only Sanitary Method of Disposing of Dead Bodies."

The regular work in the section was then resumed, Dr. Winslow Anderson, San Francisco, reading a paper on "The Prevention of Contagious and Infectious Diseases, with Special Reference to Tuberculosis."

The last paper of the session was by Dr. George M. Kober, Post Surgeon, Fort Bidwell, entitled "A Plea for the Prevention of Tuberculosis."

The Chair suggested that as it was getting late, and there were yet two more papers on the same subject, one by Dr. L. Q. Thompson, of Gridley, "Consumption is Contagious," and the other by R. A. Archibald, D.V.S., "The Relationship between Human and Bovine Tuberculosis," and as they would be in the nature of what the lawyers call cumulative evidence, he moved that they be read by title and referred to the Committee on Publication, which was done.

The previous question was then moved on the adoption of the resolution offered by Dr. J. R. Laine, which was seconded by Dr. Winslow Anderson, and the resolution was adopted unanimously.

Dr. Ruggles called for the report of the Committee on School Hygiene, and Dr. Stallard, chairman of the committee, presented the following:

Resolved, That a petition be addressed to the Legislature providing for the appointment of a competent physician to teach personal and domestic hygiene in the State Normal Schools, and that attendance on these lectures be made compulsory and a part of normal education.

Dr. William Simpson, of San José, said: "As a further point in that direction, wouldn't it be well for this convention to go a little bit farther and suggest that the State in teaching its teachers should appoint in the Normal Schools of the State a lecturer on hygiene? A large majority of the teachers in the public schools are graduates of the State Normal Schools; a very large proportion of them the State teaches free of expense. The teachers are instructed there, and before they enter the public schools as teachers they receive their education from the State at these points. My suggestion simply is that this convention recommend to the State the appointment in the State Normal Schools of a lecturer on hygiene, so that before the teacher receives a certificate entitling him or her to teach, he or she will receive from the State some instruction in this direction."

Dr. Stallard said he should be very happy to accept any modification that the convention desired made.

Dr. C. A. Ruggles said: "I look upon the action as rather coöperative with the resolution introduced by the State Medical Society a year ago to-morrow. That resolution was on the necessity of teaching hygiene in the public schools. How we are going to get at that I do not quite know. I had a conversation with the State Superintendent in relation to that matter, and I am free to admit I was very little encouraged by the result of the conversation, and naturally I elevated my spinal col-

umn a little bit, and told him we would compel him by legislation to teach hygiene in the public schools. I believe the way to gain that is to begin at the Normal Schools, over which the State has control, and make it obligatory by legislation, if necessary, that hygiene shall be taught to the young of this State." [Applause.]

Dr. Stallard accepted the suggestion, and the resolution as amended was adopted unanimously.

Dr. Winslow Anderson called up from the table the resolutions offered at the afternoon session by Dr. A. E. Regensburger in regard to cremation.

The resolutions, which were as follows, were adopted unanimously:

Resolved, That this convention indorses and approves of cremation as a rational and sanitary means for the disposal of the dead.

Resolved, That all legal restrictions to it, where they are in force, should be removed.

Resolved, That governments should employ it on the battle field in lieu of inhumation.

Resolved, That it should be adopted in all cases of infectious and zymotic diseases and during the prevalence of an epidemic.

Resolved, That it should be made obligatory in all cases of Chinese decedents, where it cannot be shown satisfactorily that they were under the observation and treatment, for their last illness, during five days preceding their demise, of a duly licensed physician and surgeon under the laws of the State of California.

Dr. Thomas Malloy offered the following:

Resolved, That it is the sense of this convention that laws for the suppression of contagious and infectious animal diseases should be enacted by the next Legislature; that the office of State Veterinarian should be created, and a competent veterinarian appointed to perform the duties of the office; be it further

Resolved, That the State Board of Health give the same its earnest attention and support.

Dr. Laine remarked that as the law now stands the Board of Health may appoint a veterinarian, but there is no provision to pay him for his services. Now animals may be prohibited admission to the State upon inspection. It is unnecessary to appoint a State Veterinarian for that purpose. It can be done at any time, and any State appropriation is unnecessary, for the law provides that any funds at the disposal of the State in the General Fund may be used for that purpose. To create the office of State Veterinarian would be to have another official, who must be paid. We have power to appoint him, but not to pay him.

Dr. Bowhill argued in favor of prompt action. It is admitted in all the papers, he said, that milk is necessary, and that it is a great source of contagion; that the milk of tuberculous cows affects the young child who uses it. In San Francisco and all other large towns there are many tuberculous cows whose milk goes into the milk supply. There is also the danger from glanders. Under the circumstances it is our duty to mankind, it is peculiarly the duty of the State Board of Health, to have diseased cattle examined. We have the milk of these tuberculous cows rushed into the market and supplied to consumers. There is no guard taken. The inspection is a farce. I read the other day of where it was done by a milk inspector. It might as well be said that an insurance company should leave the whole business of risks to be attended to by a clerk. I think there should be an officer for this particular purpose supported by the State Board of Health.

Dr. Maclay said he did not know what the law was until told by Dr. Laine. The object of the resolution is simply to get the assistance of the Board of Health to procure the necessary legislation. If we are going to have a law introduced and use our influence to get it passed,

providing for a salary for a State Veterinarian, the object of the resolution is simply to get the assistance of the Board of Health. I think the law ought to be established. There is a vast amount of disease in this State that people do not know about. Glanders, I can assure you, is very prevalent, and it is a very deadly disease, as you know.

Dr. Davisson remarked: As a member of the Board of Health I am rather in sympathy with this movement, for one reason in particular, and that is that Dr. Ruggles and I met the head of the Department of Animal Industry in Washington, and they know and seem to care but little about animal disease in California, as he told me himself; he had not been out here, and he really did not know what we did have out here. Distinguished sanitarians, among whom are Sternberg and Lloyd, make the statement in their book that such diseases as we are dealing with here do not exist in the United States. I submit that the State Board of Health of California should take an interest in this subject. As far as I am concerned, I feel favorable, in the absence of anybody else to do it, to leaving it to a State Veterinarian.

Dr. H. S. Orme said: I hope the resolution will be carried, because at the last meeting of the Sanitary Convention there was a resolution introduced, you know, requesting our Congressmen to petition Dr. Salmon to establish branches of the Bureau of Animal Industry on the Pacific Coast. As it is now, we have none.

Dr. Simpson said: I think this resolution should be altered a little, with the consent of the mover, so that it would cover the ground. As it reads, it is that laws "for the suppression of contagious and infectious animal diseases should be enacted, and the office of State Veterinarian should be created." As I understand it, this office is already created. Now, by changing the wording of this resolution so that it would read that the necessary legislation be requested to provide sufficient funds for the support of the office of State Veterinarian—would that cover the ground?

Dr. Simpson said that if the money could be provided he had no doubt the State Board would appoint the officer.

The mover accepted the proposed amendment. The resolution as amended was adopted unanimously.

On motion of Dr. Ruggles, the convention adjourned to meet at the call of the State Board of Health one year hence.

ADDRESS BY DR. C. A. RUGGLES,

President elect, and President of the State Board of Health.

One year ago to-day it was my very pleasant duty as temporary presiding officer to introduce as the President of the first sanitary convention held in California my much respected friend, Dr. Orme, of Los Angeles. Now he has had an opportunity to reciprocate the compliment by introducing me as your President. So honors are easy. I will not use the old, very old, and much worn expression, that this is the proudest moment of my life, even if I thought so; but simply, with heartfelt emphasis, say to you that I am extremely grateful for the honor thus conferred. It has been my privilege during the many years of active life to often preside over deliberative assemblies, both municipal and political. But this is the only time that I have been honored by being selected to preside over a convention of this distinguished character. So on that account I claim your kind indulgence, and ask you to overlook my many shortcomings.

A member of the State Board of Health, who takes a very great interest in sanitary matters, had had a very good opportunity to become familiar with the proceedings of other State Boards of Health, and had read much of the reports of sanitary conventions held under the auspices of those Boards. He became much interested, quite fascinated with them. Soon the thought arose in his mind, if Iowa, Kansas, Michigan, and others can have these conventions and make them so interesting and instructive, doing so much good by telling and showing the people not how to *cure*, but how to *prevent* disease, "why cannot California do the same?" That thought, on being uttered, immediately met the hearty concurrence and coöperation of the entire Board, and one year ago that thought found material expression in our first sanitary convention; an experiment, to be sure, but in the language of our worthy ex-President, Dr. Orme, it was highly profitable and successful, and my sincere desire is that yearly, and oftener if possible, each may improve upon its predecessor and steadily and surely gain the confidence of the medical profession and all who take any interest in sanitation.

At our convention held one year ago, it will be remembered that the subject of Asiatic cholera monopolized our time, almost to the exclusion of other matters. Probably it was right to have been so arranged, but fortunately that condition does not now exist. The emergency justified any effort at that time to prepare our people for the expected invader, and I most heartily congratulate the State upon its escape. Though much preparation as to money and means had been made for our protection, unnecessarily it would appear, yet I can assure you that there will be no relaxation in sanitary measures on the part of the State Board of Health for the ensuing season. In this connection I wish to say a few words in relation to the preventive measures taken by the Government.

I was honored by Governor Markham with the appointment as representative of California to the Pan-American Medical Congress, which met at Washington, last September. While in Boston, en route, I saw that cholera was reported to be in Jersey City. My duty was immediately made very plain to me, and soon I was in Jersey City, and from Surgeon-General Wyman and Surgeon Bailache, U. S. M. H. Service, and Secretary Hunt, of the State Board of Health of New Jersey, I received every courtesy possible and was enabled to telegraph to our most worthy Secretary, Dr. Laine, daily, the exact condition. Then and there I saw the greatest anomaly of the present time, especially so considered when we daily hear discussions about States rights and other like matters. It was the unity of action of national, state, and municipal sanitary bodies, all blending into one harmonious whole, without the slightest degree of friction or harshness. That I was pleased is a feeble expression of thought, and I did hope that if ever California was similarly threatened by such a foe, we might, with great profit, follow an example so successfully set by New Jersey. And I take great pleasure at this time and in this public manner to mention my obligations to those gentlemen for many acts of kindness and courtesy shown to me, *not personally*, but as a representative of California in sanitary matters. It was my privilege to be informed of the complete and perfect system of procedure by that branch of our Government as to inspection and disinfection in foreign countries, as it were, at the beginning of danger, and I unhesitatingly say that too much credit cannot be awarded to the Marine Hospital Service, under the control and personal supervision of Surgeon-General Wyman, for our fortunate exemption from Asiatic cholera.

I am not justified, possibly, in saying that cholera has been overestimated, and that too much importance has been placed upon that disease. But I do say, and defy successful contradiction, that some of our well-known communicable diseases have been too much *underestimated*—too little thought of; too little importance by comparison has been given to them, at a disastrous expense to the community. The mention of a case of cholera will set in motion all known sanitary machinery of nation and State and city, while all around, and, like the poor, always with us, are those diseases which, by their universality and frequency, have so familiarized themselves with us as to cause no dread, no great fear, and by comparison with that bestowed upon cholera, exciting very little attention, and yet many fold more disastrous in their results than cholera and yellow fever combined.

With very great fervor do I most heartily indorse the sentiment expressed by Medical Director Gihon in his admirable sermon delivered to the Section of Hygiene of the Pan-American Medical Congress assembled in Washington, September, from the text from Luke, iv, verses 41 and 42, with which most of you are undoubtedly familiar, which says in substance: "Remove the beam from your own eye before you behold the mote in your brother's." Of course, it is easily perceived that he means to be understood that we had better look at home and around us and examine closely into our condition as relates to tuberculosis, diphtheria, and other communicable diseases—large beams in our own eyes—than to go abroad to spy out and pick up small fraternal motes like cholera, a strictly foreign production, against whose introduction into the United States a high, *very* high, protective tariff should be instituted. The sentiments therein expressed have grown and

increased as the months pass away, and were it not for fear of being accused of plagiarism, I would like to speak further on it; but you can read, it yourselves, as it is published in all the sanitary and medical journals of the day.

In the natural order of sequence I am now brought to the consideration of tuberculosis, *one of Dr. Gihon's big beams*. It is my great care to avoid saying anything that by anticipation may interfere with what any member of this convention may intend to say. You have all received a notice of the intended introduction by the State Board of Health of a resolution relating to tuberculosis. I wish to say that, personally, I am very much in favor of its adoption. My feelings on that point are very positive, and I most urgently call your attention to it, hoping it will receive a free and full discussion, for certainly it is of vast and almost incalculable importance to our State, which appears at this time particularly to have become the tubercular sanitarium for the whole country.

A subject of great importance which I wish to present to your attention and ask your deliberate consideration, is the communicability of disease from animals to man, especially tuberculosis from the cow and glanders from the horse. At our last convention an admirable paper was read by Dr. F. A. Nief, a portion of which related to the above suggestion. It is possible that some there were, like myself, who did not pay the requisite attention to the paper that it deserved; to such my advice is "get it and do as I have done," read it carefully and studiously, and we will agree that the doctor did present a very important subject, and one that should receive your earnest consideration. That the milk from a tuberculous cow is the medium through which that disease is communicated to children, no one will deny who is properly informed on that subject. That there should be some legal restriction amounting to total prohibition as to its sale and use, will at once be admitted. But before that can be brought about there must be established some diagnostic method by which we can assure ourselves, as well as others, of the existence of that disease in the cow. The same suggestion is of equal weight in relation to glanders, which too often is allowed to exist under a less offensive name, threatening by the possibility of its transmission to man the very safety of humanity. The diagnostic value of tuberculin for detection of tuberculosis in cattle, and of mallein for glanders in horses, should be affirmed by you, and all possible encouragement be given to our veterinary brethren to continue in their experiments to satisfactorily establish the value of the hypodermic use of those articles in suspected animals.

I cannot find words to sufficiently express my admiration for the efforts put forth in that branch of investigation, for daily facts are brought to our notice which cause much alarm, and very much increase the great necessity of action by all sanitarians. Many foreign governments have accepted and adopted this diagnostic method, notably Russia, Germany, and France. President Cleveland in his message to Congress says: "Investigations have been made during the past year as to the means of its communication [referring to tuberculosis in cows, and the method of its correct diagnosis]. Much progress has been made in this direction, but work ought to be extended, in coöperation with local authorities, until the danger to human life arising from this cause is reduced to a minimum."

Many of you gentlemen whom I have the pleasure of meeting here I know have, from sincerity of thought and purpose, made many sacrifices to be present. The question at once arises, What good is to be derived from our meeting? As was stated one year ago, the State Board of Health wishes to be brought into closer relation with the local Boards, so that with unity of purpose, in accordance with settled plans of action, much more may be accomplished in sanitary matters. By meeting together we each impart to the other some one or more new ideas, and by mere attrition brighten up and are better prepared to meet any sanitary question so liable to arise daily. Our action deserves and will receive the confidence of the people, who see and realize that we are, so to speak, legislating in their behalf. Often does the question arise to him who has made the sacrifice of thought and action, "What encouragement is presented to justify this continued expenditure of time and thought?" Allow me briefly to say why, in my judgment, we should "persevere and faint not." More than a century ago one of the greatest American statesmen said: "We know of no way of judging the future but by the past." Age has not dimmed or diminished the truth of that memorable saying. Let us for a short time turn backward our minds to within the memory of most all of us. What gigantic revolutions have taken place in that which especially interests us! In surgery, in medicine, and in later years in sanitation. Some of us can distinctly remember the horrible preparations necessary to be made for a surgical operation—opium, brandy, straps, and much muscular restraint. Then suddenly came angelic anæsthesia, driving into oblivion and burying in the debris of the past all of the horrors of surgery, and in a pleasant dreamy sleep, no longer dreading the necessity of surgical interference, the patient quietly, cheerfully submits to all that is required. While contemplating the great revolution in that one particular, though I am not as old as I hope to be, I can very distinctly remember the privilege of witnessing the first capital operation performed under the influence of an anæsthetic, November 7, 1846, at Massachusetts General Hospital, by Dr. Haywood. What monstrous strides in progress has surgery later on made! Abdominal surgery particularly. Now the surgeon, with a bravery and confidence begotten by experience, has not much more doubt as to safety and success in opening the abdomen for the removal of ovarian or other tumors than to open the mouth fifty years ago for the extraction of a tooth.

I will not consume time to elucidate my text to judge the future by the past and to offer encouragement for a continuance of our efforts in improvement, but will simply mention some great changes in the administration of medicine. Many will remember the time when catharsis could only be produced by administration of enormous nauseous draughts of salts and senna, or equally disgusting doses of calomel and jalap, which duty is successfully done by a one or two-grain pill of podophyllin. This revolution in medicine and its administration has done more to establish the standing of the homœopath than all the "*similia similibus curantur*." These are a few of the matters involved in revolution, and equally prominent in that line is the very great change or revolution as to the cause of disease, more surprising, perhaps, than what have been mentioned. I think I can safely say that previous to a period not fifteen years ago, very much as to the cause of disease was wrapped in mystery, was very much like guess-work, in comparison to the certainty which

now prevails. Then the attending physician would look very wise, and in a very peculiar air of mystery talk about a "*materies morbi*," of which he knew nothing as to shape, size, or habitat, and would discourse very learnedly about atmospheric influences, and conclude the whole subject with a fanciful tissue of guess-work and "I think so," all of which, by comparison with that certainty which may now be obtained, is none else than groping in the dark. But the most revolting and wicked of all—because it is in direct violation of everything sacred—is to charge to visitation of Providence the death of a loved one from some communicable disease that by ignorance was not prevented. How horrid to contemplate the idea that the beneficent God would cause the innocent child to die of diphtheria as a punishment to a presumably guilty loving mother! Such "bosh" I have heard, and so have many of you, undoubtedly. Very much of this uncertainty, of this doubt, of this guess-work, has been dispelled by the wonderful microscopic researches and investigations carried on within a period of fifteen years. Since 1882, the investigations of Koch, Leffler, and others as to tuberculosis, cholera, diphtheria, and typhoid fever have been omnipotent in dispelling the cloud of uncertainty and guess-work in our diagnoses. Surely a wonderful revolution. Sanitation has received much benefit by this revolving process! What a decided change in public sentiment on that subject.

Our State Board of Health, as well as those of other States, have for quite a period of time done much in expenditure of time, talent, and money in the way of printing and circulating among the people leaflets in relation to many important sanitary questions. Undoubtedly many of these circulars have received the attention desired by the Board. But I am perfectly satisfied that though much good can be and has been done by that method, much more could be accomplished by adding thereto and supplementing personal effort of each one interested in sanitary matters. No one is without *some* influence, and all members of Boards of Health, both State and local, can do much in a missionary way among his own clientele in explaining, each in his own way, the mysteries of things unknown to those unwillingly ignorant. Many there are who cannot read; some will not trouble themselves as to them, preferring other kinds of literature, but will listen attentively to what may be said by the physician in whom they place confidence. And in this connection I do think that for public good all Boards of Health should be composed of medical men capable of thus instructing the people with whom they are brought in contact, as in my judgment our sole and entire hope for the future sanitary success is in instructing the people. Does any one doubt the success of that method? Can we not "judge the future by the past"? In my own limited experience I have met with much to encourage me in that line of procedure. Only a few years ago our local Health Officers were met frequently by the assertion from some old female fossil that diphtheria was not "catching," and who would use every effort by ridicule and almost force to obstruct the Health Officer's attempt to protect the public from contagion, sometimes aided by physicians equally ignorant and much more mercenary, who would secrete cases, and officers be ignorant of their existence. But by municipal compulsory legislation, as to cases being reported by physicians to the Health Officers, a persistent and unwearying method of instruction, and a few sad and bitter lessons in the school of experience

to those poor deluded people, a great revolution has been brought about in the limited sphere where I am somewhat acquainted. Let each person interested tell his friends and neighbors how these communicable diseases are spread, and by what media they can be prevented. Establish a kindergarten for such, and a post-graduate course for the few physicians who, by their professional prominence, are capable of making so much opposition and trouble to health authorities. Such a wonderful revolution has taken place in many localities that the authorities have no trouble in enforcing strict quarantine regulations, each one being willing to submit gracefully to any required personal inconvenience when told that it was for the public good.

The question has been often asked, and probably will be again, "What good is derived from this personal sacrifice for the public welfare? What facts, figures, and statements can be presented to justify this in very many instances great inconvenience?" With much pleasure and satisfaction am I enabled to point to the State of Michigan, whose Board of Health is under direction of its able and indefatigable Secretary, Dr. Baker, in whose statements, from a personal knowledge of the gentleman, I have unbounded confidence.

That gentleman exhibited at the World's Fair at Chicago a diagram representing the restriction and prevention of communicable diseases, and made the statement that, proven by statistics of several years, four fifths of the cases of diphtheria and scarlet fever, and the deaths therefrom, are prevented by the measures of isolation and strict quarantine which the State Board has been insisting upon the past few years. The question necessarily and naturally arises, "If in Michigan such encouraging results of sanitation can be obtained, why not in California?"

At the last session of the State Medical Society, a resolution was introduced and unanimously adopted, wherein was stated the necessity of the introduction of the study of hygiene into the public school system. What was the practical result of that resolution I am not informed, but I most cordially indorse the sentiment therein expressed, and hope that such coöperative measures may be taken by this convention as will result in obtaining the desired object. If the future hope of our country lies in the rising generation, it surely is desirable that it shall be properly instructed in the science of preservation of health. In this connection I wish to call special attention to the circular prepared by Secretary Laine and issued by the State Board of Health, entitled "School Hygiene." I do not hesitate a moment to say that it is a work well worthy of your confidence and indorsement, and one that should be in the hands of every teacher and parent in the State. So positive and sincere am I in that statement, that every teacher and School Director in the city of Stockton and county of San Joaquin received one, and I am glad to say that already I have good reason to believe much good will arise from its distribution.

SEWAGE IRRIGATION.

By H. S. ORME, M.D., of Los Angeles, Cal., Member and ex-President Los Angeles Medical Society, President State Medical Society, ex-Member American Public Health Association, and Member American Medical Association, ex-President California State Board of Health and State Medical Society, and Professor Hygiene, etc., Medical Department of the University of Southern California.

It is unnecessary to adduce to citizens of California the immense advantage of irrigation to most crops. Water, pure and simple, is such a benefit that few stop to realize that a vast amount of fertilizing matter, partly dissolved and partly held in suspension, is suffered to run to waste from all our cities and towns.

The excreta of human beings are far richer in nitrogenous constituents than those of domestic animals, from the nature of our food, and consequently they have a greater value for fertilizing. It is a poor commentary on European civilization that, except in a few instances, the white race has only recently begun to utilize substances which have contributed largely for unknown ages to sustain the dense population of despised China. It is estimated that 100 pounds of human urine are equivalent, as a fertilizer, to 1,300 pounds of fresh horse dung; yet the latter, though vastly more bulky and weighty, is saved, and the former mostly wasted.

The trouble in dealing with human excreta is their rapid decomposition, by which their value is destroyed. It is generally necessary to apply them to the soil within two or three days, and the only practicable way is by water-carriage. If kept moving, the time may be prolonged, so that they may flow for a distance of 30 or 40 miles, if necessary. Another point is, that the volume of water carrying these substances be not excessive, say not more than 50 or 60 gallons daily per capita, or the area of land within reach of a city and available for irrigation would become inadequate.

The utilizing of sewage for irrigation is not entirely new in Los Angeles, but until recently has not been thought practicable during the winter months. The past season, however, has been unusually dry (the rainfall having been only 8 inches), and it has been found that the whole sewage of the city can now be disposed of in this way. Still better, the authorities are now able to charge \$5 per head (100 inches) for the sewage for irrigation purposes during the day, and \$3 for the night. It is estimated that the daily amount of sewage is 14 heads, or 1,400 inches, on the line of the outfall sewer. I might here add that this great outfall sewer to the ocean is now finished, but the laterals and house-connections with the sewerage system are not yet completed. When the latter work shall have been done, Los Angeles will have a public work of which she may justly be proud.

A recent letter from Dr. Henry J. Barnes, of the State Board of Health of Massachusetts, and one of the best authorities in America on this subject, informs me of the complete success of sewage-farming at Framingham, in that State. This is a city of about 5,000 inhabitants.

The system was originally intended merely for intermittent filtration, but a tentative experiment showed its adaptability to fertilizing purposes, and now the land produces magnificent crops of corn, cabbage, etc. Even the vigorous winter climate does not interfere with the operation. Such has been its success, that the sub-surface disposal of the sewage of a penal institution in that neighborhood has been abandoned, and it is now applied to this farm.

To make sewage irrigation a success throughout California, we must profit by the experience of other communities where this plan has been longer in operation and financial victory has been gained. The capacity of land to dispose of sewage irrigation varies with conditions. A porous soil will receive much more than solid clayey ground. Under-drainage greatly increases this capacity; intermittent application of the liquid serves also this purpose. It may be estimated that, with varying conditions, one acre of ground will easily dispose of the excreta of 100 to 400 persons. It has been found practicable to continue this irrigation in the cold winter climates of northern Germany and Illinois, as at Dantzic and Pullman, for the flow keeps the ground from freezing. In the mild climate of Southern California it could be made practicable all winter by intermittent application and increasing the area of ground. The sewage farm at Pasadena, California, only in operation a short time, is a decided success, and will continue so if properly managed, showing to us what can be accomplished elsewhere is possible at home, by using similar methods. Probably the topographical difficulties here are not much, if any, greater than at Edinburgh, where two men (one by day, the other by night) are employed to distribute the sewage over 400 acres, the principal crop being grass. On a field formerly barren waste, the first crop of grass is gathered in the spring before vegetation has been started on neighboring ground; and the owner now receives a rental of \$125 to \$150 an acre. The irrigation system for disposing of the sewage of Paris began in 1868 on less than one acre of barren land. By 1882 this field of Gennevilliers had extended to 1,275 acres, devoted to sewage irrigation; and at present one third of the sewage of Paris, amounting to 34,000,000 gallons daily, is thus disposed of, while the rental of this land is five times as much as that of neighboring land not thus treated. In consequence of this enhanced value, the government of the city has determined not to extend the system for the benefit of private owners, but has obtained a lease of other land at the rate of \$9 50 annually per acre, with the privilege of purchase at \$320 an acre.

In 1872 the German government entered on a plan of irrigation for disposing of the sewage of Berlin, which is all utilized in this way. In a sanitary point of view the city has gained by the abolition of cess-pools, and the city is said to realize a net revenue of from 1 to 2½ per cent above the fixed charges of interest on cost and operating expenses.

The sewage farm of Croydon, England, now in operation about thirty years, has increased in assessed value from £1 to £9 an acre. At Lemington, a town of 26,000 inhabitants, it is necessary to lift the sewage 132 feet before applying it to the land, and Lord Warwick pays the town \$2,250 annually for delivering it on his land. The sewage farm at Pullman, Ill., produces cabbage, celery, and onions, and the Superintendent reported that it paid over 6 per cent profit in 1883 on the invested amount (\$80,000).

Analysis of water from the subsoil of the plain of Gennevilliers showed that it is entirely free from the properties of sewage, and quite suitable for drinking. As long as the soil is not water-logged by the excess of water, no deleterious effects upon the health of the inhabitants need be feared. On the contrary, the death-rate of Croydon has diminished since the sewage farm was established, and its productiveness has increased five-fold. In the "Sanitary Record" the death-rate of Croydon is quoted at only 11.79, showing it to be the lowest of any town or city in England.

It is alleged that sewage-farming is practicable only for towns of moderate population, owing to the high price of lands contiguous to large cities. The answer is, Paris has adopted this plan, which already disposes of one third of its sewage; Berlin uses it exclusively; Florence, Milan, and Madrid have sewage farms; Edinburgh has practiced the method for two hundred years; Birmingham thus utilizes the sewage of its 650,000 inhabitants. Including small towns, this system has been adopted by two hundred centers of population in England.

In judging this question upon its merits, we must look beyond financial results. It is more than half a sanitary matter. As long ago as 1876 the Legislature of California recognized this fact, and prohibited the pollution of streams by depositing therein dead animals or offal of any kind. It is needless to add that this law has not been strictly enforced. Even where it is practicable to discharge the sewage of cities into tide water, the trouble is not obviated, for in time the deposit of solid matters is sure to obstruct navigation, and generally the mixture of sewage with salt water becomes extremely offensive, unless immensely diluted. It must be remembered that cities often find it expensive to dispose of sewage either in running or tidal waters without creating a nuisance, while a well-regulated sewage-farm is entirely free from such objection.

The real difficulty in sewage irrigation, as in other public works, is in administration. If any way could be devised for managing public business by the same methods of economy that are employed in private affairs, the trouble would vanish.

The indispensable condition of sanitary and financial success is to divorce the administration of the system from party politics. Experience in foreign countries has demonstrated that the value and productiveness of lands thus irrigated are immensely increased, without the use of other fertilizers; and here, where farmers and gardeners are glad to pay a fair and remunerative price for plain water, there can be no economic difficulty in organizing a company and using sewage free of cost for its own lands. The only apprehension would be that the company would ask and obtain undue advantages in its franchise, in the shape of a public bonus or other favorable terms to the detriment of private interests.

CONTAGIOUS DISEASES, AND THEIR SUPPRESSION BY LEGAL MEASURES.

By GEO. CHILDS-MACDONALD, M.D., of Sausalito, F.R.C.S. (Eng.), M.R.C.S. (Eng.), Late
Res. Roy. Ed. Infirmary, Health Officer, etc.

The title of this paper I admit you will find somewhat misleading, for under it I intend wholly and solely dealing with syphilis and the legal measures which could and ought to be enforced for its extermination. The disease, as we all know, is the most frequent of human maladies, secret, but not the less widespread in its influences, therefore worthy of our serious consideration; nay, it is our duty as guardians of health to forcibly call the attention of the legislators of this and other countries to its baneful issues, not only acting as an individual, but as a race, degenerator.

Syphilis until lately was believed to have appeared during the year 1495, after Columbus' second voyage, and to the New World has been credited the doubtful honor of its nativity. This we now acknowledge to be an error: the writings of Cazenave, Follin, and Lancereau, containing quotations from ancient authors, can but force us to the belief that the disease is of great antiquity. The writings of the Jewish Bible do not give any definite description, alluding as they do to venereal diseases in a general way; but a Sanscrit treatise on medicine, entitled the "Ayurvedas of Sucrutas," written about 400 A. D., and translated into Latin by Dr. Hessler, gives a fairly full and definite account, for he speaks of primary sores, mentioning further several diseases which follow, such as skin eruptions, ulcers, ophthalmia; he also states the eruptions are contagious, heritable, and propagated by cotius. Klein, in a later treatise, 1795, says that the Malabar physicians as early as the tenth century described not only syphilis, but cured it by mercury. Hippocrates describes some affections which we now ascribe to the disease, while many of the old medical works still remaining of the early Greek and Latin physicians, speak of local ulcerations and their sequelæ, which we now speak of as its constitutional manifestations. Celsus, Arctæus, and Galen, in their writings give evidence of their familiarity with and the generality of the disease. The latter mentions its bone affections under the name of osteocopic pain. Oribasis describes moist and dry ulcers of the pudenda and anus. Marcellius Empiricus speaks of ulcers of the tibia, which eat their way inward. The erotic poems of Martial, Juvenal, and others furnish abundant description of venereal diseases of the genitals, face, mouth, and groin. They mention that these may be communicated by kissing, as well as by cotius. The introduction of the worship of Lingam from India, and Priapus into Greece, conclusively shows the ancients were aware cotius with infected persons communicated disease, while in the myths of Lingam it is related that a scourge, originating in Civa, was propagated henceforth by transmission from women to men. Seeking evidence farther east, we find the Chinese Emperor Ho-ang-ti, who reigned 2637 B. C., caused the medical writings

of the nation to be collected and formed into a systematic treatise. Here gonorrhœa is described, and in later editions there are clear accounts of chancre, phimosis, bubo, ulcerations of the tonsil, anal sores, ulcers of nose and soft palate, and coppery eruptions of the skin, cured by mercury. Here even remedies are mentioned for mercuric pytalism. So much for ancient history.

There is in the national library of Paris a treatise bearing the date of the ninth century which gives a full account of the disease, from which date it is easy to trace it by the works of successive European authors to the present day. As I before said, syphilis is the most widely and generally spread of all diseases; no country or nation is entirely free from it. In the interior of Morocco, according to recent travelers, whole tribes are affected in its most loathsome and terrible forms. In Russia, according to Dr. Podolinski, it is the principal disease of that country; in some of the villages one third of the inhabitants are contaminated. In Tavoſlawka, of 120 families 30 certainly were syphilitics, and only 64 of which were known to be healthy. Here its influence on mortality is excessive, hardly any one reaching the age of 60, while the death-rate of diseased families is half as great again as that of the remaining population. In Finland the disease is prevalent. Hjelt states that the national habits are conducive to its propagation, many families living in one house, using cloths, bedding, cups, towels, spoons, and pipes in common. The operation of cupping is universal, there being regular cuppers or bleeders. These people are frequently the vehicle by which the disease is transmitted, just as at times careless dentists are among us. In the village of Hakola, a female cupper, herself syphilitic, inoculated two hundred people with her cupping apparatus. Travelers among savage nations report the disease to have been introduced and spread with alarming rapidity and great virulence wherever Europeans have reached. The native Australian races are practically exterminated by it. There is no question as to its wide distribution among the races of India, China, Japan, Europe, and America. In Guy's Hospital, London, 43 per cent of the whole of the out-patients suffered from syphilis in some form; Hospital for diseases of the skin, 10 per cent; Hospital for diseases of the throat, 15 per cent; Moorefield Hospital for diseases of the eye, 20 per cent.

Here we must bear in mind that in London there are special hospitals for this disease, which would be a factor in reducing the percentage of general hospitals. These figures may be taken as a fair average for any large city such as Edinburgh, Manchester, Leeds, New York, Boston, Philadelphia, San Francisco, etc.; while my experience as a medical man, practicing in California, would lead me to believe that the State population makes no exception to the general rule, especially if we look to the thriving condition of the numerous quacks who make a specialty of these diseases. Now, in advocating prophylaxis, I do not want you to understand that I am doing so in the interest of those who deliberately expose themselves to contagion. My plea is for those innocent ones who are the victims of cruel circumstances, and for the material welfare of ourselves as a nation. There are admittedly many ways of inoculation, such as kissing an infected person, using the same fork, spoon, knife, or pipe, sleeping in the same sheets on which a diseased person has previously lain, dental and surgical instruments, vaccination, suckling a syphilitic child, or a

syphilized wet nurse suckling a healthy child. Physicians frequently become inoculated by examining diseased patients; rag pickers of a necessity are liable to infection, and so on through many and various conditions of life; but my plea becomes stronger when we consider the position of the young wife, the expectant mother, and her unborn child. It is easy for us to say that no man should marry who has acquired the disease; but how futile our warnings are all present too well know. We are now advocating the segregation of phthisical patients because of the tubercle bacillus. What of the bacillus of syphilis? Phthisis has slain its thousands, but syphilis its tens of thousands. The bacillus of phthisis only attacks the inherently weak, those predisposed to its action. Thus tuberculosis becomes a factor in natural selections by which these weaklings are removed and prevented from propagating their infirmities. It is therefore, so to speak, a regenerator of the race, while syphilis, attacking strong and weak alike, has no such selective properties, but its tendency is toward human degeneration, physically, mentally, and morally, of the worst kind. It spares, as we know, no part of the human frame—the muscles, bones, joints, brain, spinal cord, glands, skin, mucous membrane, hair, nails, stomach, bowels, liver, kidneys, spleen, organs of generation, the senses of hearing, sight, feeling, taste, smell, and speech; nay, mind and intelligence itself are claimed as victims to this vampire, which walks and stalks and lives, and has its being among us, and it becomes the duty of all honest, broad-minded, intelligent men to throw aside a false modesty in this matter, and stamp out the pest we, as a race, have been harboring so many years; to assist in obtaining legal enactments necessary, which may be divided into two classes: laws which are applicable to the community at large, and those which apply to the family and individual alone.

Under the first heading, concerning the public health, comprises accommodation for treatment of the infected and provision for the restriction against the spread of the disease. The old cry of unwarrantable interference with the liberty of the person can find no ground here, for we have already restrictive laws for certain diseases, as smallpox, scarlet and typhus fevers, cholera, etc., and general quarantine for our ports, to say nothing of insane asylums, inebriate institutions, anti-cigarette and prohibitory liquor laws. By neglecting to provide for the regular treatment of syphilis the State encourages quacks and ignorant charlatans, whose sole object is to empty the pockets of the patient, without regard to the treatment of the disease or to the prevention of its diffusion. Now, it is universally admitted that one of the primary factors in its propagation is by the women of ill-fame, a class which has existed from time immemorial, and which does and will continue for all time, so long as human nature is as it is. It is estimated on good authority that 40 per cent of these women suffer from some form of venereal disease. It therefore becomes our duty, as we are unable to prevent it, to license, localize, and control this social evil. For this end hospitals specially for this disease should be maintained at the expense of the State, in which these people shall be received and kept until they become non-infectious. Every woman known to be a person of ill-fame should be duly licensed; she should be compelled to attend twice a week at some municipal building set aside for this purpose, where she shall undergo a proper medical examination by a competent physician appointed by the State, who shall enter her name, age, address, and

description in a book as a means of identification, and indorse her license, such indorsement to hold good until the next examination day. Should she be found diseased, she shall be sent under arrest to the nearest State hospital, and should she not attend on the proper examination days she shall be subject to arrest, fine, and imprisonment. That no male shall marry, or obtain a marriage license, or enter into a contract marriage until he shall produce before the Recorder a certificate from a duly qualified physician who has previously been appointed to grant such certificates, stating that he is non-contagious in a venereal sense, accompanied by an affidavit that he has not contracted syphilis for three years past. That in all cases a woman who has been a prostitute shall produce a similar certificate, with the additional statement that she be capable of bearing healthy children. Should it be proved that any person by direct contact, or by his or her negligence, has caused another to be infected with syphilis, such person shall be liable to not less than seven nor more than twenty-one years' imprisonment. That every duly qualified medical practitioner shall keep a record of all cases treated by him, such book to be issued and to be under the control of the State. That any person not a duly qualified and registered physician, who shall treat any syphilitic, shall be liable to fine and imprisonment. That all wet nurses shall, before entering on their duties, obtain a certificate of health from one of the certifying physicians. That all vaccination shall be done solely by calf lymph. That all tramps and vagrants shall undergo a medical examination by one of the certifying physicians, and if found diseased shall be sent under arrest to one of the special hospitals, where they shall remain until sufficiently well to go at large.

In conclusion, I add that partial laws have been in force in Europe, but as they only reach the poorer classes and leave out the rich and influential, their success has consequently not been marked. The system I advocate would bring all kinds and conditions of men under the law.

These few remarks which I have put before you, inadequately I know, are but a nucleus, and demand your serious consideration, both as the guardians of the public health and as human beings. Knowing what we do, it becomes our duty, morally and socially, to move in this matter. The immortal bard might have meant syphilitic poison instead of hemlock when he made Hamlet's father say:

"The leprous distilment, whose effect
Holds such an enmity with blood of man
That swift as quicksilver it courses through
The natural gates and alleys of the body,
And with a sudden vigor it does posset
And curd, like eager droppings into milk,
The thin and wholesome blood: so did it mine;
And a most instant tetter bark'd about,
Most lazar-like, with vile and loathsome crust,
All my smooth body.
* * * * *
Oh, horrible! Oh, horrible! most horrible!"

THE ULTIMATE DISPOSAL OF SEWAGE.

By J. H. STALLARD, M.D., of San Francisco.

Two years ago I delivered a lecture on the problem of the sewerage of San Francisco, copies of which are at the disposal of the members of this convention. In that lecture I endeavored to demonstrate that the chief difficulty connected with the safe removal of house drainage was caused by the attempt to remove rainfall in the same sewers. That in summer, when there was absolutely no rainfall for many months, the sides of large empty sewers became the culture plates of dangerous bacteria, and that the emanations from empty sewers are the causes of disease. I endeavored to show that the size of sewers should be accurately adapted to the volume to be conveyed, and that the volume should be made as uniform as possible by the exclusion of rainfall. I maintained that every sewer requires constant flushing by an adequate supply of pure water, a condition quite impossible in large sewers. I pointed out the fact that the proper house sewage of San Francisco is derived during the summer from the Spring Valley water supply, and that no sewage leaves the city which has not been pumped into it. I had neither time nor opportunity for discussing the question of ultimate disposal, and, as nothing has been done, there is still a remote hope that a system may yet be constructed by which the waste removable by water carriage may be reconverted into useful products without danger to the public health.

It is a great misfortune that the disposal of the waste of large cities has fallen into the hands of engineers who have dealt with it almost exclusively from a mechanical point of view. To remove the sewage was the sole object. So long as the sewers were large enough, and their gradients favorable; so long as their outlets were sufficiently removed from human habitations; so long as sewage was put out of sight in a brook, river, or the sea, the problem was considered solved. Had they known and realized the fact that nature has provided a plan by which all dead and effete matters may be safely and speedily brought again within the range of active life, it is possible that their aim would have been to carry out that plan. And it is not one of the least difficulties now encountered that nearly all existing works for the removal of city refuse are positive obstructions to the end desired. Instead of making sewers adapted to the removal of sewage only, they made them to carry rainfall also. Instead of making them small enough to flush and keep sweet and wholesome, they made them large enough to drive a wagon through. They have fouled pure valley streams, and there is scarcely a river, foreshore, or estuary of which complaint has not been made, until to-day the tendency of legislation is to force upon communities the adoption of processes, chemical or mechanical, with the object of preventing the evils which have been created. At present the authorities of San Francisco have been engaged in the inquiry as to the possibility

of turning the sewage into the bay of San Francisco at such times and places as that it shall be carried out to sea. Should the existence of such a current be established, there would still be little proof that the sewage would travel as desired, or that no evil to the foreshores would ensue. There is no known instance of a large city pouring its sewage into the sea without establishing a nuisance. New York is probably the best example. But at Sandy Hook, the bathing town of Bath has been ruined by the refuse which accumulates on its foreshores. In discharging sewage safely into a tidal sea there are some insuperable difficulties. First, it is necessary to hold back the sewage either in large intercepting sewers or reservoirs, the floodgates of which have to be opened at half-ebb tide. During the filling of these reservoirs the foul gases generated on their filthy walls are forced back into the dwellings of the people. Moreover, the outlets have to be built far beyond the shoreline, and are not only costly to make, but difficult to repair. When sewage and sea water are confined together, deposits take place which stop up the outlets, and when sewage is projected into sea water, it rises to the surface, being both lighter and warmer, and it thus often refuses to follow the current which was expected to carry it away.

A remarkable proof of the impossibility of safely turning sewage into the open sea was examined by me when a Sanitary Commissioner of the *Lancet*, in the bathing town of Brighton, built upon the coast of St. George's Channel. There is here a high daily tide, running east and west along the shore with great velocity. A huge iron pipe was laid at the bottom of the sea, nearly one mile in length. Through this the sewage, which accumulated in a long intercepting sewer, was discharged twice a day at half-ebb tide. The discharge could be plainly seen from the parade. It rose like a fountain of black ink, and floated away in a black stream, which could be seen for several miles. Solid floating refuse came toward the beach, which became so offensive as to threaten the ruin of the town for bathing purposes. The method of discharge had to be done away with, and a sewer several miles long was made to convey the sewage to another place.

The sewage of London is discharged into the Thames at half tide. It is carried down the river 14 miles, and yet effete matters from the sewers may be found 15 miles above the outlet of the sewers. The sewage of Southampton was delivered in the Southampton estuary; the shores became so foul that other measures had to be adopted. But, it being granted, for the sake of argument, that the sewage of San Francisco could be carried out through the Golden Gate, is there still proof that it would go to sea? When the waters of the bay of San Francisco were fouled by the debris from hydraulic mines, it was possible to trace the course taken by the stream emerging from the Golden Gate. It passed up north, hugging the shore and the beach, which became reddened by the deposit brought down from the mines. It seems reasonable to suppose that instead of being carried out to sea, the foul matters of San Francisco sewage would float onto the same foreshores, and that they would ere long become a nuisance. The objections to disposing of the sewage in the bay are—

1. The cost and difficulty of delivering the contents of the sewers in the proper current.
2. The fundamental sanitary objection to tidal outlets.
3. The cost of the necessary reservoirs or intercepting sewers.

4. The impossibility of obtaining a firm foundation for them.
5. The sewage will rise to the surface and be liable to float away in unsuitable directions.
6. There is no certainty, therefore, that the city foreshores will not be fouled.
7. It is still more probable that foul deposits will occur on the northern beach of the Golden Gate.
8. And if not there, on the shores of Marin County, outside of the Heads.
9. The conditions for the destruction of effete matters by bacteria, and the restoration of these waste matters to the domain of active life, are not fulfilled.

In order to settle the question of the ultimate disposal of sewage, it is necessary to consider the process by which alone effete matters are effectually destroyed without danger and restored to usefulness and the purposes of life. It is now settled beyond dispute that this is accomplished by the growth, life, and death of the *Bacterium termo*, which grows, under favorable conditions, with such rapidity that the Pacific Ocean might be filled with it in less than one week. By the action of this bacterium, sewage may be converted into food for plants with an entire absence of offense to the sense of smell or of danger to the public health.

The bacterium grows under a wide range of temperature, but it requires, before all things, a large supply of oxygen, and the problem of ultimate disposal is to be solved only by arrangements which will secure this object. This can only be accomplished by passing sewage over stones or through porous sand or soil, and if this be effectual the process of bacterial growth begins at once and continues until the last vestige of organic matter has been made fit for plant food. As Waring says, the art of sewage disposal consists in suitably subjecting the matters with which we have to deal to the action of bacteria so quickly and effectively as to avoid offensive and dangerous conditions. Mr. Bailey Denton has constructed artificial filtration beds, which purified sewage to the extent of 30,000 gallons per acre, the effluent water being purer than ordinary spring water. The Massachusetts Board of Health has shown that 25,000 gallons of sewage may be purified by one acre of fine sand in a day, even in cold weather, and that the effluent water contained less nitrogenous organic matter than the waters of Lake Winipiseogee. I have, myself, examined the effluent water of the sewage farm at Aldershot. The soil was a hungry sterile sand, and the drains were 4½ feet deep. The sewage of 20,000 soldiers was utilized on 80 acres, and the effluent water was bright, clear, and devoid of organic matter. The purification of the sewage is not due to the mechanical retention of foul matters in the soil, but to the action of bacteria, which are found to be most abundant near the surface, and which disappear at the depth of from 4 to 6 feet. If germicides are added to the sewage the purification stops and the effluent water becomes foul and stinking. At Wayne, Penn., the sewage is received on an area of broken stone 8 inches deep, 75 feet wide, and 90 feet long. The flow is 10,000 gallons an hour. The area of irrigation is 4 acres, and it is capable of clearing 200,000 gallons every day, one third of the area being used each day. The effluent water is perfectly pure and frequently drunk by visitors. The coarse matters are detained amongst the stones, and the partially purified

sewage is distributed on a prepared soil. These fields of broken stone are used every third day, and then go dry.

The capacity of properly prepared soil for purifying sewage has not as yet been reached. It is not destroyed by use, and may be largely increased. One thing of cardinal importance has to be secured, viz., absolute porosity. There must be no stagnation, no water-logging. There must be secured a proper outlet for the sewage after filtering through the soil. The nature of the soil seems to be of small account so long as under-drainage is maintained. At Crewe, in England, the sewage irrigation farm is a strong clay, and yet 4,000 gallons of sewage are daily applied to each acre without any bad effects. From this it seems certain that, in the words of Richardson, "all sewage must be conveyed to the land which hints for it—the land which alone disarms it of its dangers—the land which becomes exhausted and infertile if its demands for organic refuse are not naturally supplied." This conclusion has been indorsed by very high authority. The Royal English Commission reported that the *right* way to dispose of town sewage is to apply it continuously to land. The Local Government Board (the chief sanitary authority in England) say that sewage can best and most cheaply be disposed of by the process of land irrigation. The Society of Arts of London say that irrigation is the best method of disposal. The report of the French savants states that the most economical, practical, and efficacious means of sewage disposal is the irrigation of a sufficiently permeable soil, and they report that the plain of Gennevilliers attests conclusively not only that luxuriant vegetation results, but establishes harmlessness in respect to health, as well as perfect purification of the water. At Gennevilliers the sewage of 400 persons is applied daily to every acre.

The Corporation of Glasgow reported that the evils of crude sewage will make themselves felt when poured into a running stream, into a tidal river, or into the open sea. The Italian Commission of Turin declare that irrigation is the only efficacious method of sewage disposal. In fact, every public inquiry for thirty years past has concluded that the only safe means of disposal is by land irrigation. Now, the capacity of various soils varies greatly, but is mainly determined by their permanent porosity and efficient under-drainage. Percolation must be constant. Some soils will purify 100,000 gallons of sewage per acre per day; but the cultivation must be good, and the under-drains must be six feet deep. Under such conditions the effluent water will be bright, inodorous, and nearly colorless. The difficulties of efficient sewage irrigation are greatly increased by rainfall, which, if admitted to the sewers, adds to the bulk, and if received on the farm interferes with the absorption and percolation of the sewage. The following table shows the condition of sewage irrigation in England. But it must be remembered that, as compared with California, the English rainfall is large and continuous, and that the great value of land near large towns is an obstacle to its appropriation for irrigation purposes:

	Population.	Acres.	Sewage per Acre.
Bedford	4,000	130	8,000
Birmingham	620,000	1,220	13,000
Blackburn	116,000	700	5,000
Burton-on-Trent	46,000	430	10,000
Crewe	31,000	*255	4,000
Doncaster	24,000	270	2,000
Edinburgh	270,000	333	33,000
Kidderminster	30,000	192	9,000
Norwich	95,000	500	8,000
Nottingham	240,000	650	15,000
Warwick	12,000	134	4,000
Beddington	73,000	420	8,000
Totals	1,357,000	5,234	119,000

* Strong clay.

260 persons to each acre; 10,000 gallons of sewage per acre daily.

Although it is not desirable that the disposal of sewage by irrigation should be determined on the basis of profit and loss, it may, nevertheless, be demonstrated that in no case need the loss be great, whilst the possibilities of profit are considerable, and in California the question of climate assumes an aspect of supreme importance. The advantages of irrigation in California must of necessity be much greater than in England, where the occurrence of land drought is only exceptional. In California much of the land is sterile during half the year, and for even longer, should the rainfall fail. With suitable irrigation, even of clear mountain water, the produce of California may easily be trebled, and with sewage irrigation it is difficult to realize what the produce would amount to. At Aldershot the land employed for irrigation was purchased by the Government for 12 cents an acre. It produced nothing but a scrub heather, not more than a few inches high. After seven years of irrigation I saw again this farm, which was rented out to market gardeners at the annual rate of \$100 per acre. In 1865, Mr. Hope bought a farm of 127 acres, about 30 miles from London, for \$400 an acre, and he leased the sewage of the neighboring county town, having about 6,000 inhabitants. At the time of Mr. Hope's purchase the labor of the farm was done by a master farmer, his two sons, and two horses. The annual rental was \$10 per acre. Mr. Hope was required to pump the sewage as fast as it came from the town. He leveled the land, made irrigation gutters, and put in under-drains. I saw this farm five years afterwards, when there were employed upon it 25 horses, 30 men, besides a small army of women and children. The cost of cultivation was \$175 an acre, and the value of the produce was more than double.

Let us consider this question with special reference to San Francisco. Allowing for reasonable waste from evaporation and absorption, the water supplied by the Spring Valley company in winter may be taken as a guide to estimate the bulk of sewage. That supply in winter, which represents the house consumption, is said to be 18,000,000 gallons daily, of which it is possible that 15,000,000 or 16,000,000 would reach the sewers after domestic use. With proper arrangements on a well-managed farm, 20,000 gallons may be readily disposed of on each acre the year through, and much more during the dry season. At this rate there would be

required an area of 800 acres. Let it be assumed that this farm so far from being a nuisance would be a positive benefit to the locality, as is the case at Gennevilliers and other places, and it may be certain that at least 1,000 acres could be found within a reasonable distance of the city, say within 20 miles. If we attempt to estimate the volume of sewage by the population we may reasonably calculate that one acre of land may be safely made to receive the sewage of 500 persons, or say 700 acres for 350,000 people. In order to carry sewage 20 miles a fall of 50 feet will be required, and if proper intercepting sewers are constructed, not less than two thirds of the sewage of San Francisco could be delivered 20 miles away from the city without pumping, and the remainder would be a bagatelle, for we must not forget that the total sewage of San Francisco may be conveyed away in conduits no larger than those used to bring the water into the city. Between South San Francisco and Redwood there are many thousands of acres which might be made suitable for sewage irrigation; even below high-water mark, land that is now entirely useless might be reclaimed from the bay and its foreshores.

MODERN CREMATION AS A MEANS FOR THE DISPOSAL OF THE DEAD.

By ALFRED E. REGENSBURGER, M.D., of San Francisco, California, ex-Member of the Board of Directors of the San Francisco Cremation Company, Vice-President of the San Francisco Bacteriological Society, Secretary of the American International Medico-Legal Congress of Medical Jurisprudence for 1893, Member of the American Public Health Association, etc.

Mr. President and members of the Second Annual Sanitary Convention of the State of California:

Few subjects are of such paramount importance to the physician, to the sanitarian, and to him who takes any interest in the public weal; indeed to the individual, to communities, to the State, and to the world, as modern cremation. At the outset this may seem to a person who has given it no thought, a bold, a very bold, assertion. A little study and some reflection will convince even the most doubting Thomas that it is and will continue to be one of the vital sanitary questions of the present and of the near future, and that its economic, utilitarian, and other aspects demand more than a passing notice. It must be faced as inevitably as death itself. What shall we do with our dead? Bury them or cremate them? That is the problem to be solved.

To be sure, other modes for the disposal of the dead have been had recourse to in different parts of the world and at various periods. In Judea the dead were put away in sepulchres. The Egyptians embalmed them. The Greeks at first buried their dead, but later incinerated them, denying incineration to unteethed children, suicides, and persons struck by lightning. The Romans followed in the footsteps of the Greeks, and cremated their dead from the close of the republic to the end of the fourth century of our era. These are not all the means for the disposal of the dead followed in times past, but are the ones most used. With the exception of earth-burial they need not detain us.

The sanitary reasons for discontinuing earth-burial and substituting modern cremation for it stand out so prominently that it does not require much of an effort to make them patent to an audience constituted, as this one is, of those conversant with public hygiene. Even one who knows nothing about the matter will be struck by the fact of so many sanitary regulations and legal enactments which are in existence and are continually being made concerning the starting, maintenance, and management of cemeteries. If these places were so innocuous to the public health, so innocent of disease and death-dealing properties, and so free from all danger to the sanitary welfare of the State, why should the statute books be incumbered with so many laws which try to minimize, if not to avert, the danger resulting from them? Why not so many laws, if any, in case of other subjects which are, confessedly, not dangerous to health and life? It must be admitted that the presence of any burial ground is identical in its effects upon health and longevity as is that of any other accumulation of putrefying animal matter. That eminent English surgeon of world-wide reputation, Sir Henry Thompson,

tersely and truly says that "no dead body is ever placed in the soil without polluting the earth, the air, and the water above and about it."

In proportion as burial grounds are overcrowded and filled up, are dangerous effluvia given off, and as a consequence thereof are the surrounding air, earth, and water contaminated. Brick graves, leaden shells, oak coffins, vaults, and the like, "retard decomposition and be foul natural decay," as Mr. Seymour Haden very correctly states, and, if anything, only make matters worse.

In 1884, cholera was prevalent in Spain, and thence spread to Italy and France. It first appeared in Spain after the earthquakes at Granada. It was demonstrated that it originated from the emanations given off from the bodies of those killed in the earthquakes and buried within the city limits.

In 1785 the old cemeteries of Paris became so detrimental and dangerous to health that new ones were opened. These in their turn soon became unsanitary. We learn from the archives of the French Academy of Medicine that the districts near Mount Parnasse, Père-la-Chaise, and other cemeteries were very unhealthy, many of the inhabitants of those districts suffering and dying from zymotic and other diseases due to the nearness of the cemeteries. We need not cross the ocean for an exemplification of that truth; we see it right here on this side of the Atlantic. The township of Newtown, Long Island, New York, which is surrounded by cemeteries containing the decaying remains of 1,250,000 human bodies, has the highest death-rate in the State of New York. The same condition of affairs exists in the neighborhood of all large cemeteries in a greater or less degree. Of Philadelphia, it may be said that it has the highest annual death-rate of any city in the Union, which is unquestionably accounted for by the Schuylkill and Delaware Rivers being polluted by seven large cemeteries which are drained into them, and thereby infect the Fairmount waterworks, from which the city receives its water supply. Dr. Franklin Gauntt, of Burlington, New Jersey, gives it as his opinion that "the Schuylkill River, that meanders through the Fairmount Park, is polluted by seepage from the cemeteries near its banks." The same physician further says that "these little drops of water squeezed by 'Father Time' from the dead are loaded with death for the living who drink it. In fact, I have heard professional men in Philadelphia say that when you drink Schuylkill water you are sampling your grandfather. It is commonly stated that in certain analyses made of this water traces of the oil of cedar have been found, and it came from the coffins and cedar cases of those buried in Laurel Hill Cemetery." "That the dead do kill the living," says Dr. W. H. Curtis, "is only too true, and that cholera, yellow fever, and the whole list of zymotic and infectious diseases are capable of being transmitted through the contamination of air and water supplies, is no more difficult of demonstration than it is to prove the ability of sewer gas or sewer water to propagate disease."

Disturbing unused burial grounds or disinterring buried human remains which were supposed to be no menace to health and life, often has been the cause of disease and death. Dr. J. Lewis Smith, of New York, in a paper read March 12, 1891, before the New York Academy of Medicine, tells of a case of a grave-digger who exhumed the remains of a human being who had died of diphtheria and been buried twenty-three years, and who (the grave-digger) succumbed to it himself. According to the researches of the French government into the cause

of the plague in Egypt in 1823, it was shown that it was owing to the digging up of graves in disused cemeteries at Kelioub, near Cairo. The latter city suffered severely, and Kelioub lost 2,000 of its inhabitants—a very large percentage. Professor Bianchi believes that the plague which occurred at Modena in 1828 was caused by disturbing the graves where those who died of that malady had been buried over three hundred years. Mr. Cooper tells us how the malignancy of the cholera in 1854, in London, was aggravated by the digging of sewers in the soil where the victims of the plague of 1665 were buried. When the parish church at Winchinhampton was remodeled and some of the earth from the cemetery was sold for manure, it resulted in decimating the population.

It would appear that time does not destroy the vitality of germs. Grain entombed with Egyptian mummies for forty centuries has been planted and sprouted. Dr. Fred Peterson, in an article on cremation, which appeared in the issue of April, 1881, of the "Buffalo Medical and Surgical Journal," very pointedly asks: "By what authority, then, can we affirm that life departs from disease germs by inhumation? How dare we preserve in the South vast depots of yellow fever fomites, coffers of Asiatic cholera, and every year accumulate and treasure up small-pox, scarlet fever, whooping-cough, diphtheria, and measles?"

Within the last decade bacteriology has taught us that disease germs, or bacteria, may be frozen or exposed to a very high temperature and still retain their vitality and their ability to propagate their species. Bolton saw certain water bacteria thrive in an ice chest at 6° C., and other observers watched them increase at a freezing temperature. Low temperatures do not destroy all varieties or species of bacteria. Frisch, in 1877, subjected micrococci to a temperature of -87° C., obtained by the evaporation of liquid carbonic acid gas, and that did not prevent them from multiplying again when the temperature was increased. The experiments of Sternberg showed that the staphylococcus pyogenes aureus withstood a freezing temperature for 66 days, a fluorescent bacillus from Hudson River ice for 77 days, and the bacillus of typhoid fever for 103 days. The same observer gives, on page 147 of his manual on bacteriology (by the way, one of the best works on the subject in the English language), the thermal death-point of various bacteria. Among others that of the—

<i>Spirillum cholera asiaticæ</i> at	52° C., or 125.6° F.
<i>Bacillus typho-abdominalis</i>	50° C., or 122° F.
<i>Bacillus pneumoniae</i> (Friedlander's)	56° C., or 132.8° F.
<i>Staphylococcus pyogenes aureus</i>	58° C., or 136.4° F.
<i>Staphylococcus pyogenes citreus</i>	62° C., or 143.6° F.
<i>Staphylococcus pyogenes albus</i>	62° C., or 143.6° F.
<i>Sarcina luteæ</i>	64° C., or 147.2° F.

All these, except the *spirillum cholera asiaticæ*, were exposed to the elevated temperature for ten minutes. He also states that certain bacteria are not only not destroyed, but are able to multiply at 65° to 70° C. Thill, in 1881, grew a bacillus found in the Seine at 69° to 70° C. Globig found soil bacteria growing from 60° to 70° C. Voelsch claims that the tubercle bacillus of sputum was not destroyed by 100° C. From these statements it appears that all bacteria are not affected by the ordinary temperatures, and it would seem, according to Globig, that bacteria found in the soil are very tenacious of life.

Whether the soil bacteria are dangerous or not to health, is perhaps yet an open question. But may not other bacteria which are dangerous

to health find lodgment, thrive, and withstand very low and very high temperatures therein, and that, too, in graveyards? Pasteur found the bacillus of anthrax in the soil in which had been buried animals that had died from it, and sheep that were browsing on such land were affected by and succumbed to anthrax.

"The horribly offensive gases which are given off from dead animals in a state of putrefaction appear to be due to certain large anaërobic bacilli which are found in such material, and which have not yet been thoroughly studied, owing to the difficulty of cultivating them in artificial media; among them is a large bacillus with round ends, which forms an oval spore at one extremity of the rather long rod," says Dr. Sternberg. This micro-organism he terms *bacillus cadaveris grandis*.

Numerous other putrefactive bacilli have been studied, among others the *proteus vulgaris*, *proteus mirabilis*, and the *proteus zenkeri* of Hausen. These species of *proteus* produce a chemical poison, which, when injected into small animals, gives rise to all the symptoms of putrid intoxication. These bacilli (the *bacillus cadaveris grandis* and other anaërobic bacilli found in putrefying masses) are more or less pathogenic. Other anaërobic bacilli exist which grow in the absence of oxygen in the interior of decomposing animal material, while aërobic saprophytes may grow and increase on the surface of decaying animal material with which the air comes in contact. According to one of Koch's postulates, which has been proven to be true over and over again, we know that culture liquids of anthrax and other diseases injected will cause the disease and death. Bacteria need not be injected to do this, but deleterious and even lethal effects are caused by their inhalation by the way of the respiratory organs. This occurs in what is known in England under the designation of "wool-sorter's disease," where men handle and sort wool clipped from animals that had anthrax, and whose wool contains anthrax bacilli. This disease, which killed the victims in some instances, was contracted in this wise. This mode of infection is fraught with danger.

What is there to prevent the germs of disease being wafted from the germ-laden atmosphere of a cemetery over a whole city, if the city is located in the direction of the wind from such a death-dealing place? It is impossible to foretell when an epidemic may arise from such a cause, as neither any fixed time nor any ordinary temperature destroys the activity of these germs, as we have seen. Has not the same thing occurred in Burlington, Iowa? Rauch, in his "Intramural Interments in Populous Cities," relates how that took place at the last-named city in 1850. A very important matter for San Francisco, where the winds, which blow for a greater part of the year, and more steadily in one direction than in most places, become contaminated by passing over some of the most crowded and most popular cemeteries before they reach it. That city should be doubly careful about what concerns burial places, as it possesses a danger which our Eastern and European cities do not, and that is a Chinese population. These people may be afflicted with every disease, be buried, and what is more, their remains be disinterred, after a longer or shorter period, for shipment to China, as is their custom. This is still further emphasized by figures from the health reports of San Francisco for the fiscal year ending June 30, 1893 (which I am enabled to quote, through the kindness of Dr. James W. Keeney, the affable and competent Health Officer of San Francisco), which show the

death-rate of these people to be higher than that of the other races—23 per cent per 1,000 Mongolians, against 18 per cent per 1,000 of the other races. From the same source it also appears that there were 86 Chinese disinterments during that period. If we remember that they are often, if not nearly always, attended by irregular practitioners of their own race and nationality, who do not diagnosticate the disease properly, and further, even if cognizant of its nature, the cases are not always reported to the authorities, we can well conceive what a menace to life and health that condition of affairs engenders.

Without giving more facts and data concerning the sanitary side of the question, I may reiterate, as proven, this statement as covering the ground, and which occurs in my article entitled "Earth-burial and Cremation, considered from a Sanitary Standpoint": "Air, earth, and water are so poisoned by the products of decomposition emanating from buried remains of persons, many of whom labored under all forms of ills, that they are capable of harboring, generating, and originating every form of disease, and, secondarily, may be the occult means of undermining the hygienic conditions of whole communities, that earth-burial should be discountenanced and forbidden by law as being prejudicial to the public health."

Latterly it has been contended that there need be no more danger from the proximity of cemeteries to the dwellings of the living, modern rapid means of communication making it possible to remove the cemeteries so far away that they cannot affect the sanitary state of the people. Supposing that you remove the cemeteries a distance from the cities, what right have you to plant such a menace to life and health in the midst of a rural population? Will it do away with the danger, as far as those are concerned whose duties and vocations bring them and keep them there during a longer or shorter period of time? Will it not attract a population whose duties compel them to pass part of their time in these places, and allure others who gain a livelihood from the first named? Finally, will it not, in time, be the center of a town? It may even encroach upon the city limits which it was never expected to touch. It does not solve the question. Already in this young city (San Francisco) burial grounds have to be laid out in the immediate vicinity, the old ones being overcrowded. In the no distant future they also will be in the center of a large population, and will have to be closed up, and probably removed.

In spite of the foregoing facts, and notwithstanding that numerous others, aye, that the experience of the past and the whole medical literature may be drawn upon in substantiation of them, inhumation is still practiced. Old cemeteries are being overcrowded and filled up, and new ones continually opened. Thousands upon thousands of acres of land, which might be made productive, are given over to the dead, whom they do not benefit, but, absolutely, injure the living, considered from a sanitary, economic, and utilitarian standpoint. This is no overdrawn picture seen through the befogged and biased spectacles of the enthusiast.

About 4,000 acres of land in the immediate vicinity of New York and Brooklyn, N. Y., which are used for cemetery purposes, and are exempt from taxation, may be cited as one of the many illustrations which may be given. Within their borders thousands of bodies are interred annually. A high sanitary authority places the limit of the number of bodies to be buried in an acre of ground at 1,000.

The population of New York and Brooklyn, New York, in 1890, was 2,485,177, and the combined average death-rate in both cities, 23.90, giving us 59,930 deaths in the two places. What an amount of land must be appropriated for the use of the dead in the future! Cobb, in his excellent book on "Earth-burial and Cremation," voices a growing sentiment in speaking of Newtown, Long Island, New York, which is environed by cemeteries, when he says: "Against the intolerable evils we have mentioned," having reference to the utilization of land for burial purposes, and at the same time to its injuring the living, "the authorities of Newtown have for years contended in vain. They see their property injured, health threatened, and hundreds of acres stricken from the tax-roll and dedicated to the occupancy of the stranger dead."

This represents the pecuniary loss in measure that it causes to communities, but upon families and the individual it bears still harder, viewed from another side. It costs money to live, but it takes more money in proportion to die. The extravagant expenses incurred when a man is laid away to his "eternal rest" (?), as the anti-cremationists would put it, often represent a large percentage of what the deceased used during his lifetime, particularly if he lived in moderate circumstances and did not attain an advanced age. By a false pride, fostered by an erroneous conception of what is due to the departed, coupled with a desire not to be outdone by their neighbors, those who are left behind often really impoverish themselves by having expensive and ostentatious funerals, far beyond their means. The high-priced burial plot, for the cost of which a large part of the whole cemetery was originally bought, and for which amount, at all events, several hundred times its land acreage could be bought right outside of and adjoining the cemetery gates or fence; then the very expensive coffin or casket, which is seen for a few hours, only to be put under the sod to molder away, and other incidental disbursements connected with inhumation, must certainly be placed on the credit side of cremation. This all comes when the family of the deceased are least able to stand it. The bread-winner of the family, perhaps, has been removed; their savings, if there were any, have been eaten up by the necessary expenses of the last illness of their beloved and dear departed one. When they have recuperated from this financial holocaust there comes bankruptcy staring them in the face for a monument to be erected. When they have survived that expenditure a mortgage is put upon their pockets in the shape of payments at short intervals for keeping the plot in order, which lasts as long as they do, if they are able to stand the drain and are too sentimental or afraid to rebel against it.

Such a magnitude has this assumed that societies having for their object the suppression of this evil (for that is the proper appellation for these high expenses often connected with earth-burial) have been formed in various parts of the civilized world. The cost of inhumation rolls up into the hundreds of dollars; that of incineration but to a fraction thereof.

With all this expenditure of money, the remains of the deceased are not secure from body-snatching, a matter of a good deal of moment in the case of illustrious and rich persons. The present generation all remember the stealing of the body of the New York millionaire, A. T. Stewart, from his mausoleum. The trouble taken to avoid such an occurrence in the case of the great Grant, and in that of the lamented

Garfield, are matters of public record. Many will remember how the lonely vigils at Lake View cemetery, near Cleveland, Ohio, where all that is mortal of Garfield is entombed, dethroned the reason of one of the sentinels on duty. With cremation no such possibility exists.

More than all this is the horror of some persons of being buried alive. Every physician of any experience must have encountered cases in his practice where death was not feared as much as being buried alive. He must recall promises having been exacted from him that he should take every precaution to avoid such an occurrence taking place. While with the stethoscope, the electric battery, and other tests, and waiting till putrefaction has set in, the scientific physician can guard against such a dreaded catastrophe, yet the very thought of it is sufficient of itself to make him advise cremation instead of earth-burial.

This is only a small part of what may be advanced in favor of cremation and against inhumation. Against incineration very little can be said. Only one objection has been raised which merits a few words. It has been urged that by the adoption of cremation as a means for the disposal of the dead, evidences of crime in case of poisoning could be removed and guilty persons escape punishment. With a view of elucidating this matter Sir Henry Thompson addressed inquiries to three hundred coroners, with the result of eliciting the fact that only one hundred exhumations had occurred in England and Wales during a period of twenty years, and of these but twenty were for suspected cases of poisoning. From the same source we also learn that there were only five exhumations and but one for alleged poisoning in England and Wales in 1886, during which year there occurred in these two countries 537,276 deaths. In many cases of poisoning all evidence and all traces of poisoning are destroyed and lost by the putrefactive changes which take place very soon after burial. In cases of inhumation, where the remains have been embalmed, who can say whether the poison found has been introduced before or after death? The finding of certain pathological lesions might raise a presumption, but only a presumption in a few cases, that death was positively and certainly due to poison introduced into the body ante-mortem. Furthermore, many of the mineral poisons may be detected in the ashes or in the smoke, and the vegetable poisons, with few exceptions, disappear in the process of decomposition. So few exhumations are undertaken in proportion to the number of inhumations that it amounts to nothing, particularly when the advantages of cremation outweigh those of burial so much. Forsooth, it may be looked at as an argument for cremation, as it may be the means of having such legal safeguards thrown around the granting of permits for cremation as will make it nigh impossible for a case of poisoning to escape detection. It will lead to a revision, if not to an abrogation, of our present loose system of granting burial permits. If it did nothing more, it would be desirable to adopt it.

What is there opposed to it? The process itself is so cleanly, so rapid, and so free from all offensive features that the most exacting cannot find fault with or take umbrage at it. Of this a convincing proof can be furnished by a visit to the crematory of the San Francisco Cremation Company, at Cypress Lawn, San Mateo County (a short distance from San Francisco), which is well worthy of inspection.

Religion hardly can be said to form a barrier to its practice. Some of the most eminent divines are outspoken in its favor. The dogma of

the resurrection cannot be utilized against cremation. If that were so, then what became of the blessed martyrs burned at the stake? Are those who have been burned to a crisp in trying to rescue a fellow mortal from death by fire, lost and denied salvation?

No, it is not so much religion as a sentimental prejudice that is opposed to cremation. It is a sentiment begotten of an education which is based simply on usage and custom, and which does not inquire into its *raison d'être*. Fortunately, it is the thinking world that governs and rules. It is to the thinking world that cremation appeals, and by which it will be heard. Opposition to it will disappear as its advantages are understood. Let the world brush aside the cobwebs of ignorance and superstition of bygone days, so that the rays of modern enlightenment may radiate over its mental vista, with the result of leading to the adoption of cremation as the universal means for the disposal of the dead of the future.

The shortness of this session does not permit of trespassing any longer on the time and indulgence of the convention, but sufficient has been said to justify the hope that the resolutions here presented may be adopted as evincing the views of this body:

Resolved, That this convention indorses and approves of cremation as a rational and sanitary means for the disposal of the dead.

Resolved, That all legal restrictions to it, where they are in force, should be removed.

Resolved, That governments should employ it on the battle-field in lieu of inhumation.

Resolved, That it should be adopted in all cases of infectious and zymotic diseases, and during the prevalence of an epidemic.

Resolved, That it should be made obligatory in all cases of Chinese decedents where it cannot be shown satisfactorily that they were under observation and treatment for their last illness, during five days preceding their demise, of a duly licensed physician and surgeon under the laws of the State of California.

SANITATION OF DWELLINGS, PUBLIC BUILDINGS, AND THOROUGHFARES.

By J. H. DAVISSON, M.D., of Los Angeles, Member of State Board of Health, ex-President of Los Angeles Medical Society, Member of American Public Health Association, Member of American Medical Association, Member of California State Medical Society, etc.

There is no department of sanitary medicine which concerns the masses as does domestic sanitation and sanitation of public buildings and thoroughfares. Their hygiene is not a subject of interest at intervals, like many other departments of our art, but always a live issue, and of paramount importance, because it involves the health and life of every individual at all times and places.

Household sanitation properly includes not only a consideration of the house and all that is contained in it, but its environs as well. It is not the object of this paper to enter into tedious details of location and construction, but to treat of the divisions of this subject in a restricted sense, to avoid a paper of too great length, dealing more particularly with sanitation of the interior.

All buildings, both public and private, should be located on high and dry ground, and with reference to the air currents or wind and sunshine. Residences and public buildings should be constructed, where admissible, upon the detached or cottage plan, rather than in rows and palatial, and upon foundations suitably prepared of cement or grout (except in California, where simply brick answers for small buildings), with proper elevation and thorough ventilation under the structure. One-story cottages properly planned and elevated, with good attics, may be constituted comfortable and hygienic residences; but in the revival of the colonial style of architecture—with a few modifications—the two-story residence is both artistic and convenient, economical and sanitary, and well adapted to any climatic conditions. Frame or wooden houses are best for our climate, while brick is most satisfactory in cold climates. The Spanish idea of *patois*, or large courts instead of dark rooms, in large buildings for every purpose, is to be commended, and our advanced civilization should discountenance piling brick, stone, iron, and mortar, or other building material, heavenward in the unsanitary effort to build domicile upon domicile and office upon office, when nature has provided so much territory. Indeed, the tall tower, monument, or church spire is but little in advance of the pyramids, and might, without irreverence, be displaced with something new, rational, sensible, and sanitary in our progressive age of reason. The tall church spires are sometimes more pleasing to the senses than many of their adornments. Imagine the spectacle of the angel Gabriel impaled upon a church spire, blowing his last trump! Such was the adornment of the First Presbyterian Church of the city of Los Angeles, until years of ridicule caused it to be displaced a few years ago by a globe as an emblem.

Every room, both public and private, should be large and well arranged for sunlight, heat, and ventilation. All plumbing should be

done with reference to sanitary results, and, where possible, should be open for constant inspection, and all fixtures properly trapped and vented to avoid siphonage. McClellan's automatic venting, though a little expensive, is probably the best for security against sewer-gas. All fixtures and plumbing in every building should be in constant use, or be frequently flushed, to prevent the seal of the traps being broken by evaporation, which soon occurs in our dry and airy climate. This may occur to summer residences and hotels at the seashore or in the mountains, and may occur to school-houses during vacation. All water-closets should be supplied with modern automatic flush-tanks, properly connected to avoid siphonage or other accidents; and with plenty of water, care in construction, and good plumbing, these modern, odorless, and consequently sanitary closets can be easily kept in order, and may be placed in any building with comparative safety.

Every house, private or public, should be properly heated, lighted, and well ventilated. It is a mistake, in California, or in any other similarly mild climate, to plan and construct houses, residences, or other buildings, without providing suitable heating apparatus. Although for the greater part of the year no artificial heat is required for health and comfort, still, in marine climates and near mountain regions the meteorological conditions are such as to require artificial heat for both health and comfort for a period of two or three months during the year. It is to be regretted that many residences and school-houses, and other public buildings, have been constructed with an utter disregard for heating—not being supplied with grates, furnaces, stoves, or steam or hot water heaters, and without flues or chimneys. In consequence of these gross defects in construction, and for other reasons—false economy—many resort to the vilest of all methods of heating, or attempting to heat, with kerosene lamps and stoves, and as a result such chambers are poorly heated, and filled with the unsavory fumes of kerosene, and they burn out the life-giving oxygen and replace it with noxious carbon dioxide. This condition of things is deplorable, though quite universal and most unsanitary. The statement has been often made that architects have not kept pace with the sanitarian, a statement which is oftentimes provoked by the false notions of economy of the householder, rather than lack of knowledge on the part of the architect and builder. Gas stoves and grates properly constructed are less objectionable on the score of accidents, than kerosene stoves or lamps, and are more satisfactory for heating in our climate, but they are not as sanitary as open grates or hot air furnaces with pure air intakes. Steam or hot water is very satisfactory for large buildings, and especially in cold climates where much heat is required with constancy.

The question of properly heating thoroughfares is even more difficult to handle than that just considered, and as yet no plan in use is entirely satisfactory. The trouble is not altogether one of heating, but also of ventilation. Several years ago my friend, Dr. Reed, of Mansfield, Ohio, made extensive observations with reference to heating coaches and sleeping cars on railway trains, and found varying temperatures at short intervals, owing to circumstances connected with running, stopping, etc., and after investigating the then methods of steam heating, he concluded that no method in use was satisfactory, and that no advance in that direction had been made in years.

Heating of steamships offers much less difficulty, and we will pass it

with this statement. Heating and ventilation are separated in theory but associated in practice. However correct this may be, provision for proper ventilation or pure air currents to displace dead or impregnated air should be made in all buildings, regardless of heating and independent of it. For large buildings and institutions the fan system of ventilation is now much in vogue, but its principal objection is the cost of maintaining it.

The water supply of every building, railway coach, sleeping car, or steamship is of the greatest importance. It is needless to say that the source should, if possible, be free from any suspicion of contamination, and the supply abundant and pure. In view of the possibility of pollution and the fact that there are so many hidden sources of infection, all drinking water should be recently filtered or sterilized by boiling. The Pasteur germ-proof or porcelain filter is probably the best, and can be and should be applied to the filtration of drinking water in dwellings, public buildings, and thoroughfares. It is simple in construction, easily attached to fixtures, easily cleansed, and not expensive. When there is danger of pollution or a suspicion of pathogenic germs, and a suitable filter is not in use, the water should be boiled, as boiling destroys all pathogenic germs in ten minutes. (Sternberg.) If boiling does render drinking water rather unsavory, it has the advantages of being effectual in the face of danger from infection, and it is within the reach of the most impecunious. Next to the air we breathe, water is probably the most important element in nature, and it should not only be pure but abundant. The British War Department allows fifteen gallons of water daily to each soldier, and this quantity contemplates a sponge bath. Cities and towns require more, while American cities allow about fifty gallons daily per capita, and some even more. (Rohe's Hygiene.)

Since ice has gone into such general use, its purity should always be tested by competent inspection before it goes to the consumer. If natural ice, its source should be guarded to prevent pollution, as freezing does not destroy pathogenic germs, notably the bacillus of Eberth, which is often found in natural ice. In the manufacture of ice all water should be distilled prior to freezing. While a member of the City Board of Health of Los Angeles, a few years ago, I introduced a resolution directing an ordinance which should require all artificial ice to be made from distilled water. A storm of indignation by certain ice factories followed, and I was accused of complicity with a few factories which distilled the water prior to freezing. But the resolution, which seemed at first so objectionable to certain factories, had the desired effect, as it corrected many errors and much carelessness in all the details of manufacture, and had the effect of calling the attention of consumers to the necessity of knowing the source and quality of their ice supply.

Although not properly within the purview of this paper, you will permit me to say that the average American eats, as he does everything else, in a hurry, and does not give that care to the selection and preparation of food products that their importance demands. Man being omnivorous, requires a greater variety of foods than other animals, and also requires that it shall be properly prepared or cooked prior to ingestion; and most foods which require cooking should be either boiled, baked, roasted, broiled, or steamed; but few should be fried. On coming to California most every one learns that California fruits are healthful, and acting upon that fact they eat to excess of oranges, grapes, figs,

pears, peaches, apricots, strawberries, olives, etc., forgetting their capacity for fruits, and suffer from digestive disturbances in consequence. Many in like manner learn that our California wines are healthful, and drink them regardless of indications, or, rather, contra-indications. Alcoholics are not essentially foods, and can be dispensed with in most cases, except where indicated for certain chronic ailments of nutrition, and their judicious use in health as table beverages. Though alcoholics have valuable therapeutic indications, as in severe fevers, like typhoid, typhus, pneumonia, etc., to arrest retrograde changes due to the temperature—than which there is no more potent agency—yet most persons in health are better without them.

Perhaps the most unsanitary features of dwellings, public buildings, and thoroughfares to-day are the furnishings—the carpets, curtains, draperies, and upholstery, to say nothing of the odious folding-beds in use in private and public houses. With tuberculosis unrestricted, heavy woolen carpets, rugs, curtains, and upholstery, as found in most all residences, offices, public buildings, elevators, and such thoroughfares as sleeping-cars and steamships, are hotbeds of infection and furnish conditions favorable for the reception, retention, and spread of tuberculosis, diphtheria, scarlet fever, and all diseases due to microbes and infections. These filthy woollens, chenilles, and plushes will retain the bacillus tuberculosis in a potential condition for two and one half months, or even longer, when hidden in these fabrics from the sunlight, as they are usually located in apartments. Tuberculous patients scatter the bacilli in the streets, railway coaches, sleepers, steamships, elevators, in fact, everywhere, and the sputum dries and becomes pulverized and floats in the air along with particles of dust, and the common mode of infection is the inhalation of these bacilli by the weak and delicate. The bacilli, also floating about in the air currents, lodge in drinking water and fall upon articles of food which do not require cooking, and are swallowed, which is the next most common mode of infection or spread of the disease. The same is true, in less degree, of other pathogenic microbes. How often is infection transported from town to town, and from State to State, and from continent to continent by means of the filthy carpets, plushes, and hangings of sleeping-cars and steamships! Welcome the day when sanitary science or fashion, which plays so important a part in our sociology, shall put an end to all these unsanitary furnishings and suggest something better in their stead. The genius of fashion that suggested the painted and inlaid floors instead of carpets, and wooden and leather furniture, with now and then iron or brass, instead of so much upholstery, made long strides in the right direction; but, unfortunately, these hygienic, rational, and beautiful finishings and decorations have not become universal, though there is yet hope for these beneficent innovations. Inlaid or painted floors, linoleums properly treated, with movable rugs of light materials, which can be easily cleansed, constitute the most sanitary finishings and furnishings at our command for all buildings and thoroughfares.

The restriction of infection by police regulations or quarantine is not absolute in practice. The history of every epidemic of cholera has proven the correctness of this statement, as with other germ-producing diseases; hence, we can only lessen the chances of infection by doing away with elements favorable for habitat and transportation.

The question of restriction of tuberculosis by restraint or relative

quarantine, from the nature and circumstances of development, confronts us with greater difficulties than all other infectious or preventable diseases combined, and from its prevalence and fatality it heads the list in importance. To-day every thoroughfare, elevator, public building, and many of our residences are filled with the fatal bacillus tuberculosis, which find lodgment in the unsanitary furnishings above mentioned. If we cannot quarantine the bacillus, we can render it homeless, in a measure, by substituting hygienic decorations and furnishings.

Cranberg experimented with many materials for removing the germs of infection from painted floors, walls, carpets, furniture, etc., and gave the preference to moist sponges; while others, including the Philadelphia Board of Health, recommended fresh bread. Many cities in France make obligatory a disinfection after death from tuberculosis, and the Philadelphia Board of Health, March 6th, declared consumption infectious, and recommended disinfection after death or removal. The plan in many German public institutions of supplying tuberculous patients with cuspidors containing a solution of bichloride of mercury (1 to 700), which should be acid and 1 to 500, and compelling patients to use them, should not be considered a hardship, and can be applied to buildings and thoroughfares.

The analysis of mortuary statistics in Massachusetts since the establishment of the Massachusetts State Board of Health, in 1870, by J. F. Allyne Adams, is most interesting, but conclusions are not always up to expectations. He concludes that since 1870 the death-rate is practically unchanged by sanitation. Though consumption has declined, and pneumonia, bronchitis, cancer, diseases of the brain, heart, and kidneys (diseases which are not preventable) have increased, the diseases of childhood, which include most preventable diseases, have been reduced 30 per cent by sanitation. (Wyman and Banks, Annual, 1893.)

The desire to cover the important points of this paper, together with the fact that the hygiene of residences can be applied with little variation to public buildings and thoroughfares in the main, led me to select so comprehensive a title, believing that the repetition of hygienic facts by sanitarians, and their enunciation and publication by Boards of Health, are the best means of educating the masses and disseminating correct ideas of sanitation.

INDIO—THE COLORADO DESERT FOR HEALTH.

By WALTER LINDLEY, M.D., ex-President of the Medical Society of the State of California, and Superintendent of the Whittier State School.

Indio, the central locality of the Colorado Desert, is situated in Riverside County, eighty miles from Los Angeles, on the Southern Pacific Railroad. It is the most arid civilized town in America, the rainfall in 1890 being 0.73 of an inch. Of this amount, 0.05 of an inch fell in February, 0.15 of an inch in April, 0.10 of an inch in August, 0.21 of an inch in September, and 0.22 of an inch in December. In 1891, there fell 3.06 inches, but this all fell in February and August, 1.91 inches having fallen in February and 1.15 inches in August. In 1892, there fell 2.69 inches. Of this, 2.09 inches fell in January, 0.35 of an inch in February, 0.25 of an inch in March. In 1893, there fell 3.60 inches. Of this, 0.03 of an inch fell in January, 1.61 inches in March, 0.95 of an inch in May, 0.05 of an inch in July, 0.75 of an inch in August, 0.07 of an inch in September, and 0.14 of an inch in November. Making an average annual rainfall of 2.50 inches.

Some idea of the temperature of this place may be gained from the following table for 1893: In January, the lowest point registered by the thermometer was 35°, the highest 90°, and the mean temperature at 7 A. M. 45°; at 2 P. M., 83°, and at 9 P. M., 58°. In February, the lowest point reached was 40° and the highest 90°. In March, the lowest was 40° and the highest 101°. In April, the lowest was 50° and the highest 100°. In May, the lowest was 60° and the highest 103°. In June, the lowest was 70° and the highest 111°. In July, the lowest was 75° and the highest 116°. In August, the lowest was 78° and the highest 116°. In September, the lowest was 70° and the highest 115°. In October, the lowest was 50° and the highest 102°. In November, the lowest was 30° and the highest 90°. In December, the lowest was 30° and the highest 80°.

The altitude of Indio is 50 feet below sea-level. It is in the basin which lies from sea-level to 350 feet below sea-level, and of which the Salton Lake of two or three years ago was a portion. This lake was about twenty-five miles from the town of Indio. Indio has a good hotel, post office, telegraph office, store, and an excellent water supply. Four miles from the town is an extensive grove of palm trees that are indigenous to this desert. In these forests at Indio there are five hundred of these giant palms, standing far enough apart so that they do not lose their individuality. When we go in the midst of them, one feels as though he is surrounded by the giants of the story books of his childhood, and almost expects to see them suddenly walk away. Almost all of these great palms have been burned around their bases. This has been done by the Indians. Some say they burn these trees in order to cause the fruit to mature rapidly. The dates from these trees are much sought for by the natives, and yet they will ruin the trees in order to get this fruit early. Others say that they burn the trees, believing that the aroma is gratifying and pleasant to the spirits of their departed friends. Whatever the cause, it is a great shame that these beautiful trees should be thus destroyed, and the Government should take some steps to protect

this unique forest. With a little care, this palm grove in the midst of California's great desert could be made one of the most attractive points in America. There are in this grove a number of little palm trees springing up, and in their first appearance they simulate a blade of grass. An expenditure by the Government of a few hundred dollars annually to protect these little sprouting trees and prevent injury to the older ones, would soon bring this remarkable place into a state of great beauty.

From Indio can be seen Mounts San Jacinto, San Bernardino, and Grayback, on all of which there is snow the year round. Near the town is an Indian village inhabited by the tribe known as the Cohuillas, who are said to be vegetarians and cremationists. About twenty miles from Indio are the great Volcano Springs, and twenty-five miles away are the Salton Salt Works. In fact, there are many things of interest in this vicinity, and one never grows tired of watching the varied tints of the mountains that surround this basin.

For many years I have seen indisputable evidences of the benefits derived from the climate of Indio. Persons suffering from rheumatism, asthma, phthisis, and nervous prostration are all benefited. I do not mean that all persons suffering from these diseases are benefited, but that a large proportion of cases in all these diseases improve greatly at Indio there is no doubt.

The combination of aridity and high altitude injures the person suffering from overwork and nervous trouble, while the aridity with a low altitude soothes and rests, and thus benefits those who have been suffering from a nervous strain. The physician who has a patient suffering from insomnia can conscientiously send him to Indio. The nights are most delightful. It is the usual plan of the hotel to throw open all the windows and doors, and practically sleep outside, and yet no person catches cold. The consumptive, who along the coast finds it necessary to protect himself from the night air, can here sleep out with impunity. The physicians recommending patients to try Indio should caution them to first write and secure accommodations at the hotel, because there is always a far greater demand than there is room for. The principal owners of this town would show their wisdom by putting up a number of three-room cottages, or say two rooms and a bath, so that the consumptive would not be annoyed by being brought in proximity to other invalids. These cottages could probably be built for \$300 each, and would thus solve the problem of giving comfortable quarters for the patient without necessitating the exposure to the depressing influence that comes from other invalids, or, if the patient is a person of means, it might pay for him to build his own cottage, and the meals could be served from the hotel. The frail patient should not attempt to remain at Indio later than May, and should not return before October, yet the sufferer from rheumatism might be benefited by remaining during the hot months. I have been out on this desert in midsummer and suffered very little inconvenience from the great heat. This is due to the dryness of the atmosphere. No sunstrokes ever occur, and men work out in the hot sun during the very hottest of weather. In this locality, California has a health resort to compare with which there is no other place in the world. Its great advantages are: first, aridity; second, mildness of temperature during the winter months; third, equality of temperature; fourth, excellent water supply; fifth, good hotel accommodations; and sixth, satisfactory railroad facilities.

RAVAGES OF THE BACILLUS ANTHRACIS IN CALIFORNIA.

By CEPHAS L. BARD, M.D., of Ventura, Cal., President Ventura Board of Health, President Southern California Medical Society, Member of State Medical Society of California, Member of American Medical Association, etc.

Of all the pathogenic bacteria, none is so familiar to the profession as the bacillus anthracis. It is not only the first which was subjected to artificial growth, but on account of its ready susceptibility to culture, is usually selected in experimentation. It eagerly accepts an invitation to feed upon almost everything which may be offered it. So marked is this disposition and so easy of manipulation is it, that it has always been regarded as a great favorite by the bacteriologist. By him it is prized as much as is the frog by the physiologist. Its utility in the investigation of infectious diseases and in the study of the action of germicides, has been of inestimable value to mankind. Its beneficial employment within the laboratory to some extent compensates for its disastrous effects outside its walls. Unaided by the fostering hand of the bacteriologist, it is never found free in nature. Its sole habitat, for any considerable period at least, is the body of one which has suffered from the effects of anthrax or splenic fever in some form of its manifestations. Multiplying with marvelous rapidity by fission or segmentation, it produces its ill effects mainly by relieving the red blood corpuscles of their burden of oxygen, and by impairing their usefulness as vehicles of that essential gas. Its increased numbers vitiate the vital fluid, rendering it unfit as a pabulum, and by blocking up the blood-vessels they interfere with the nutrition of important organs. Davaine states that a single drop of blood often contains eight to ten millions of these destructive micro-organisms. Within the body it exists only as the rod-shaped bacterium, as illustrated in our text-books. As such, after the death of its victim, its existence is ephemeral and its power of inflicting additional damages limited. It succumbs quickly to ordinary physical and chemical causes, especially to heat, cold, and strong sunlight. If, by chance, it should with food enter the alimentary canal, it is speedily destroyed by the gastric juice. If wafted into the pulmonary tract by a breath of air, it greedily attacks the lungs, but its action is chiefly a local one. It may also gain, with difficulty, admission to the system by being brought in contact with an abrasion of the integument. So slight is its tenure on life that it would not be an object for serious consideration were not its perpetuity secured by sporulation or germination. The spores or seeds, the result of this wonderful process, are never found within the body of a living animal or within the intact, unbroken carcass of a dead one. The presence of oxygen is absolutely requisite for their formation.

When fully formed, unlike their progenitor, the bacillus, they are almost absolutely indestructible. They luxuriate in a prolonged bath of a 5 per cent carbolic acid solution, and their resistance to fire is salamandroid in quality, being capable of existing in a temperature of

212° F. for a short period. The gelatinous envelope in which they are encased is probably, without exception, the hardest substance known in the vegetable kingdom, sustaining in it the position that the diamond occupies in the mineral domain. The spore is the test-object used in the laboratory for the investigation of the action of germicides, and any agent which can destroy it can safely be recommended to the surgeons as an efficient antiseptic.

Sporulation prolongs the existence of the bacillus indefinitely. As a spore it may so remain for years. It has been known to retain its vitality for more than twenty. Its latency depends entirely upon its environments. Like the Egyptian corn, which has been stored away for centuries in the pyramids, it only awaits favorable conditions to be aroused into activity. The "open sesame" which effects the bursting of its flinty shell and the metamorphosis of its contents to the original organism, is the presence of a suitable culture medium, consisting of moisture, oxygen, and a nitrogenized pabulum. This, under favorable circumstances, may be offered by the soil, but no other exists aside from that prepared in the laboratory, except that of a living body. Ingested with food, it is not stayed by the gastric juice, but passes unscathed through the pyloric portal to the intestinal tract, where the alkalinity of the secretions and the temperature favor their rapid development, and, as bacilli, they quickly gain admission to the system through the lymphatics, or more directly by piercing the blood-vessels. Like the bacilli, also, they may be carried into the lungs by dust-laden air, where they obtain lodgment, develop, and pass swiftly into the system. They may also produce local and general infection by being brought in contact with sores or abrasions of the cuticle, where the conditions are favorable for their lodgment and development.

One form of infection is directly attributed to flies, mosquitoes, ticks, and other blood-suckers, carrying the bacilli or spores from a diseased or dead animal to a living one. The fly and mosquito, as we well know, are the carriers of other pathogenic germs. Livingston, the African explorer, describes the tsetse fly, which transmits to all bovine animals a slow, wasting fever. It is well proven that the Texas cattle fever in the majority of cases is due to infection from ticks, which burrow into the skin and inject the poison which they have brought from diseased animals. Surgical instruments which have not been sterilized after use have been known to transmit the disease under discussion. A short time ago a German surgeon reported a case of infection in an operation wound due to the use of infected ligature, known in the market as catgut, but the principal supply of which is derived from the intestines of lambs. In this instance, the animal from which the material was obtained, was diseased by anthrax. That the bacillus may be transmitted from the pregnant female to the fœtus is as yet an unsettled point. As the lacteal secretion is dried up very rapidly in diseased animals, we have no record of any infection from the use of their milk. That some animals are more susceptible to splenic fever than others, and that some are immune, was quickly noticed by the early observers. It is chiefly confined to the herbivora and omnivora. The carnivora are almost immune. Principally observed in sheep, cattle, and horses, it claims victims from the fauna of the entire globe. The heavy-furred beasts of the Arctic and the huge pachyderms of the Tropics are laid low by this infinitesimal organism. Birds, some varieties more than

others, succumb to it, and it has been known to affect fishes. The receptivity or susceptibility of man is less marked. An inoculation which would destroy one of the lower animals, in him will produce a local manifestation only.

The symptoms of the disease in animals vary greatly, depending upon the site of infection. If in the intestines, they are very similar to, if not identical with, those of septicæmia. If in the lungs, they correspond with those of pneumonia, and if in the skin, they consist of postules, carbuncles, and œdema, which may also appear on the mucous membrane. Autopsies reveal rapid decomposition, coagulated blood, enlarged friable spleen, and extravasation of blood in nearly all of the internal organs. More or less blood-stained fluid is found in the cavities of the thorax, pericardium, and abdomen. The same forms exist in infected man, and the symptoms are closely allied to those described. Considering that he is not a grazing animal, and therefore less liable to ingest spores with his food; that the sporule is absent in freshly dressed infected meat; and that the bacillus, if present, is destroyed by the gastric juice; it would not be expected that many cases of the intestinal form or true splenic fever, so common in animals, would be encountered in men. Although we have no late mention of such occurrence, we have the authority of Kircher for the statement that 60,000 people died in Naples and vicinity in 1617; and of Law that 16,000 perished in San Domingo in 1770, from feeding upon meat procured from infected animals. Rawitch states that thousands of persons die every year during which the disease appears in the steppes of Russia from eating infected horse flesh. This alarming mortality is attributable to some extent to the filthy habits of the natives of the sections named, and to the contamination of the food, subsequent to its cooking, by the knives, forks, dishes, and tables used. According to Leube and Masing but two cases of splenic fever in man have been known to recover. The sudden deaths occurring in workingmen employed in woolen mills, especially those in charge of assorting and combing the material, were inexplicable until 1880, long after Davaine's announcement of the etiological relationship of the bacillus anthracis to the disease under discussion, when Professor Greenfield, of London, under governmental auspices, conducted his elaborate investigations and showed the connection of the bacillus with what is known as the "wool-sorter's disease." The symptoms of this form of anthrax are the counterpart of those pertaining to pleuro-pneumonia. The most common variety of the disease, however, to which our attention as physicians is called, is that local manifestation known as malignant pustule. Appearing in uncovered portions of the body, produced by contact with diseased or dead animals, or their hides, or by bites of flies and insects which have fed upon infected flesh, it manifests itself as a red spot, followed by a vesicle which soon becomes a foul gangrenous pustule, very dark in color, and surrounded by a hard, reddened areola. If situated on an extremity, the entire member participates in the inflammatory action, becoming inflamed and hardened, and there is involvement of the neighboring lymphatics and glands. If on the face, the entire countenance becomes darkened and distorted; the eyes close; and in bad cases there is extension to the neck, embarrassing respiration and deglutition. The mortality from malignant pustule is not great. In infected European districts it has been rated by Nicolai at 5 per cent, and by Lengyel and Korani at 9 per cent. The slight fatality is

explained by the fact that the pores and gland ducts are the habitat of other bacteria, which find access to the system as difficult as does the bacillus anthracis through the perfect armor in which the human body is encased.

Anthrax is a very ancient malady, and there exist many allusions to it by the older writers. The "grievous murrain" which swept from the plains of Egypt the herds of cattle, horses, camels, asses, and sheep was due to the little micro-organism so assiduously cultivated by the bacteriologist. It is interesting to note in the account of this epidemic, as described in Exodus, that the disease was confined to the herbivora, and that there is no mention of the carnivora succumbing to it. Virgil, in the Third Georgic, describes a murrain which is generally accepted as being identical with splenic fever. It is supposed to be the "black blane" of the old English writers, and the "elf-shot" creatures of the all-observant Shakespeare's fancy were those affected with it. No other disease, excepting tuberculosis, is so widely diffused, and but few others have been so disastrous. As an example of its ravages, it may be stated that in a single year (1864) 72,000 horses were destroyed by it in Russia. Bollinger states that in the Province of Novgorod, during a period of four years, more than 56,000 animals, including horses, cattle, and sheep, as well as 555 men, fell victims to it. While every portion of the globe has witnessed outbreaks of it, some countries, owing to the character of the soil and climate, have been the greatest sufferers. Sections in which swamps and overflowed land exist, where the summers are very hot, are noted for its frequent and severe epidemics. Russia, France, Germany, Italy, and Spain have not been free from it for years, and so common is it in Siberia that there it can be regarded as panzoötic. It is said to be the disease which, prior to 1850, the year in which the bacillus was discovered and its causal relationship established, destroyed many animals in the Southern and Southwestern States of our country. Gross states that it existed in Louisiana in 1851, and we have positive knowledge of its existence in New York State during the years 1870 to 1880. Sternberg, in his Manual of Bacteriology, the only standard work in America, states that anthrax does not exist in the United States. Coming from an infected region, and intimately associated with the treatment of the disease, so far as man is concerned, at least, I am prepared to say that the soil of certain sections of our State is polluted by the presence of the bacillus anthracis, and has been so for more than twenty years, during which period there have been frequent outbreaks of the disease in animals, so frequent, in fact, that anthrax may be said to be enzoötic in the mentioned district. Its diagnosis has not only been substantiated by the characteristic symptoms and its transmission to man, but has been confirmed by finding the bacillus in the blood of affected animals by the use of the microscope in skillful hands. The region referred to, so far as my knowledge goes, comprises portions of the counties of Los Angeles, Orange, San Diego, Kern, and Ventura. The assertion of our Surgeon-General has been due to the fact that his attention has not been called to it, and that the subject has not secured from medical men the consideration it deserves.

The literature pertaining to the malady as it appears in the infected counties is limited, consisting of but two papers, one by Dr. D. Granville MacGowan, late Health Officer of the city of Los Angeles, and the other by myself. These were read before the Southern California Medical

Society, and were afterward published; the former in the "Occidental Medical Times," August, 1892, and the latter in "The Southern California Practitioner," in December of the same year. In my present description of the appearance and existence of the disease, I confine myself to the results of my observations in my own county, where I have practiced medicine for more than a quarter of a century.

In the summer of 1872, a Basque sheep owner, Peter Edouart by name, residing near Bakersfield, placed in his band of sheep, 5,000 in number, some bucks which had been imported from an infected district of France. Shortly after this acquisition the animals began to die from the effects of a disease which to the owner was unknown. Concluding that it might be due to local causes, he started toward the cooler country of the coast. Descending the San Francisquito Cañon, he proceeded to San Fernando, and from there to the plains of Ventura County. In six weeks he lost more than half of his flock, and the localities where it grazed are infected to this day. Quoting from my previous article: "They have been swept by fire; deluged by rain; torn up by the plow; exposed to the glary heat of a southern sun; deserted for years at a time; but the resumption of their use as a range has invariably resulted in an outbreak of the disease."

One of these ranges, two years after its infection by Edouart's band, was rented by a sheep man, who placed on it a band of 8,000 sheep. Shortly after its occupation the malady appeared, and in two years' time the owner, who was stubborn, deaf to advice from others, and determined to remain, lost every one of them. On the same ranch, a few years later, the majority of a band of cattle, 700 in number, succumbed to the same disease.

Last November a firm of cattlemen leased an infected ranch, upon which 750 indigenous cattle were at the time grazing. No manifestation of the disease had occurred for years. The importation of 195 head from an uninfected locality, but fifteen miles away, was followed by the appearance of the disease, which virtually carried away every one of them. Nine hundred more were brought in from Arizona, and of these 600 perished, the remainder being saved by their removal. The cattle which were native to the ranch were not infected. The process of infection since its inception has steadily progressed, so that many places in the mentioned counties are for the time being unfit for grazing purposes.

Plethora is a predisposing cause, and fat animals—those prepared for the market—are most apt to succumb to it. It is roughly estimated that the mortality in the entire infected district since its appearance is 6,000 cattle and more than 100,000 sheep. The outbreaks do not occur annually, and are more apt to occur in those years characterized by wet winters, followed by very hot summers. A few horses used by vaqueros on the infected ranches have died, but there is no record of any epidemic occurring among them, as the ranges have never been devoted to them. Hogs, especially those fed upon infected carcasses, and those grazing in infected regions, invariably perish. So do goats which accompany the bands of sheep. The infected district is noticeably deprived of deer, hare, and the swarming colonies of rabbits and spermophiles. The quail which feed on infected soil, and the buzzards which claim the carcasses as their prey, are not affected. Chickens which share the lot of the herder in his peregrinations are immune, and there is no evidence that the trout streams have been polluted by the death of their finny

occupants. The assertion that the carnivora are exempt is verified by my observation. The shepherd's dog and the thieving coyote feed on diseased flesh with impunity. "Although the disease in animals," quoting again from my former article, "is usually manifested in the internal form, we, as physicians, as yet have been brought in contact solely with its external manifestations. No case of splenic fever occurring in man has as yet been recorded in Southern California. One sudden death noticed in my field of work has been generally attributed by the sheepmen to eating the flesh of a sheep which had succumbed to the disease. Who knows but what some other deaths happening in remote localities, where the diagnosis has been obscure, may have been due to this form? The immunity of the herder to the internal form is doubtless due to the fact that he seldom, if ever, partakes of infected meat. It is readily seen, however, that he could eat such meat with safety, provided that it was very fresh and taken from an animal which had just expired, and before the development of sporules, for the entrance of bacilli into the alimentary canal is rendered innocuous by the gastric juice. The lessened liability of the carnivora to the disease may also account for the immunity of the herder, whose diet is so largely animal in character." Since the first appearance of the disease there have been at least one hundred cases of malignant pustule in Ventura County. They have corresponded in every particular to the description already given, and with but one exception were situated in exposed portions of the body. The majority of these were in herders who had inoculated themselves when skinning diseased animals. The others were inoculated by fly bites. In this number were two ladies and two children.

One case in a man, situated on the arm near the shoulder, was due, I think, to the medium of a tick. I have never seen a case transmitted from man to man or from man to animal. All of my cases, with the exception of one, resulted in recovery.

The fatal case, the first and only one to occur in Ventura County, was, with the two fatal cases recorded by Dr. D. G. MacGowan, the third and last recorded in California. Its particulars and those of the subsequent autopsy, the only one ever made in California, and quite possibly in America, are fully described in my other article. The examination made three hours after death showed signs of advanced decomposition, but the usual gas bubbles which are found in this condition were absent. A great deal of stress is laid on this feature by the bacteriologist as a result of his observations in the laboratory. Infiltration of blood existed in the subcutaneous cellular tissue and large splanchnic cavities. The lungs were inflated, congested, and oedematous. The heart was filled with black blood. The liver and kidneys were normal. The spleen was adherent with thickened capsule and but slightly enlarged; it was extremely soft, pulsatous and crepitated like lung tissue. A microscopical examination, made six hours after the autopsy, of blood obtained from different portions of the body, showed it swarming with the rod-shaped bacilli and their spores. Sections of the spleen, liver, and the involved axillary glands, under the glass, also exhibited their presence in countless numbers. This rapid development of the spores, which, as already stated, are never found in the living animal or intact carcass, is remarkable, as in their artificial cultivation a longer time is required.

From the recorded cases of Dr. MacGowan and of myself the mortality of malignant pustule would seem to be much lower than that existing in European countries. The herder, who is usually a Spanish or French Basque, is in constant dread of this terrible scourge and is quick to apply for relief when infected.

The treatment of the disease, as variously recommended, consists of excision, cauterization, and the local and hypodermic application of carbolic acid, iodine, permanganate of potassium, or corrosive sublimate. Davis-Colley reports the successful use of ipecacuanha, locally in form of powder, and internally in five-grain doses every four hours. Muskett, who in South Africa treated fifty cases without a death, used it also. Evans in experiments finds that this drug in five, four, three, and two grains, added to tubes containing one and a fourth drachms of broth, invariably destroyed the vitality of the anthrax bacilli present, and no growth occurred in the tubes inoculated, provided that the bacilli contain no spores.

The treatment usually followed in California's infected district has consisted of the hypodermic and local application of carbolic acid. During the last few years, however, I have relied upon deep crucial incisions and the application of a saturated solution of the mercuric bichloride, supplemented by the usual antiseptic dressing. In all cases, stimulants, quinine, and the tincture of the chloride of iron have been administered internally.

What can be done to suppress this standing menace to a waning but nevertheless an important industry? What action can be taken to prevent contamination of our soil, infection of our herds, inoculation of their guardians, and the pollution of the poor workingmen in distant factories? That the disease will continue to exist is a prediction in accordance with our knowledge of its characteristics. California furnishes the most favorable predisposing causes: nutritious grasses, inducing plethora; alternation of cold nights with warm days; rich alluvial soil; and wet winters, succeeded, especially in the interior valleys, by hot summers.

While France and Germany enact and enforce laws tending to the suppression of the disease, England and the United States have displayed no legislation in that direction.

In our own State, however, a law was framed by our Legislature on March 16, 1889, authorizing the Supervisors of the different counties to appoint, if so requested to do by a petition of not less than fifty names, a Sheep Commissioner, whose duties were to be defined and determined by said Supervisors. Reference to the ordinances and transactions of the several counties in the infected district show no appointment at any time of any such official. The stock owner can do much for himself and charge unaided by the agency of the law. Drainage and cultivation of the range will materially diminish the chance of its contamination. It can be stocked with Algerine sheep, and some other varieties which are immune. We have no knowledge of any brand of cattle or horses, however, for which the bacillus anthracis is not pathogenic. He can protect his flock from importation of infected stock. In the event of an outbreak, by leaving his range and keeping his animals in motion, he can manage to save the bulk of them. As the disease is only communicable by the inhibition of the bacillus or spore, the moving herd is comparatively safe, as the cause exists only in the discharges and

carcasses which remain behind to infect others which may graze on the abandoned pasture. The only effectual method of preventing future contamination consists in the destruction of the carcasses of those which have succumbed to the disease. This can be done by burning them or burying them deeply in the soil. Owing to the prevailing scarcity of fuel, especially on our treeless plains, the first method is not very practicable. Owing to the disinclination of the herder, the second is never fully accomplished, the body usually being deposited just beneath the sod. Burial at the depth of six feet is quite effectual. Whilst sporulation may occur in surface soil at any temperature between 59° and 110° Fahr., it cannot exist in a carcass covered by six or eight feet of earth where the perpetuation of the infection is only preserved by a continuous generation of the bacillus. Pasteur's theory, that the common earth-worm may carry the bacilli to the surface, where sporulation would quickly ensue, does not detract from the efficacy of this method of disposal of the carcass, for it has been lately shown that it is not tenable, and furthermore earth-worms do not exist in any great numbers in California. In Siberia, where splenic fever is enzoötic and where its ravages are so terrible as to be called the Siberian plague, great reliance is placed in deep burial as a preventive measure; and during the frequent outbreaks large numbers of soldiers are detailed to carry out this sanitary provision.

Protective inoculation, introduced by Pasteur about twelve years ago, has been extensively used in France, and to a slight extent with cattle in California's infected district. It has not been followed, however, by the success predicted for it. The fluid used in the process is bouillon, in which the bacilli, modified by heat, have multiplied, and are present in great numbers. The French claim that it has been successful with them, and that their losses of animals have been much reduced by its use. Others contend that a great difficulty exists in the variable degree of alterations of the vaccine and the varying susceptibility of animals. They admit, however, that whilst in sheep the losses are greater and directly due to vaccination, that in cattle it is accompanied by fewer losses, and that it is protective in localities where the disease appears annually and is due to the polluted soil. It should be remembered that the culture fluid contains bacilli, which may regain their original virulence, and the vaccination, therefore, should not be used on uninfected soil. As a prophylactic measure in man, especially in the factories, wetting the wool, which to some extent prevents the spores from floating in the atmosphere to be inhaled by the workmen, has proved successful. Those engaged in removing hides from diseased animals and in dressing them, which, by the way, are readily recognized by their darker color, can protect themselves by using gloves or by coating their hands and arms with vaseline, lard, or oil.

Without the heavy hand of the law, however, but little can be done to stamp out this scourge so menacing to our industries. It should be invoked to prevent the importation of diseased animals; to compel owners to destroy at once the carcasses of those which have died; and to make it a penal offense to sell infected meat, or to ship hides removed from diseased animals. These measures can be obtained by the appointment of an inspector who would rigidly enforce the enactments, or by some other form of legislation.

An appeal from this assembly would accomplish much toward obtain-

ing the desired end. As individuals, we owe it to our patients and to the welfare of the commonwealth. We should be ever aware that confined as is the disease and slight as have been the outbreaks as compared with those in other countries, we may witness its extension with corresponding mortality.

"Nor do those ills on single bodies prey,
But oftener bring the nation to decay
And sweep the present stock and future hope away."

SANITARY LEGISLATION.

By H. A. SPENCER, V.S., of San José.

MR. PRESIDENT AND GENTLEMEN: Recognizing, as I do, that the members of this Board are the select of one of the grandest and most noble of all professions, whose conscientious aims are directed to the restoration of the sick, the amelioration of suffering, and the promotion of longevity in the human race, it is with no little trepidation that I appear before your honorable body as an earnest advocate to advance the interests of and assist in elevating the veterinary profession of this State. In furtherance of this motive we supplicate for the privilege of cooperating with you in your great work as public sanitarians.

While I am aware that quackery and ignorance have in the past done much to bring into disrepute the profession I have the honor to represent on this occasion, I am confident that through the untiring efforts of our members, the cloud that has heretofore obscured our utility is fast being dispelled, and that our really honorable and scientific vocation is being recognized as one of the most useful adjuncts to the medical fraternity.

In witness of this, among other things may be cited the interest taken and money expended by our Government in the creation of the Bureau of Animal Industry at Washington, whose renowned investigations are presided over by a most efficient corps of veterinarians whose researches in micro-histology and morbid pathology are of world-wide repute, and through the indefatigable labors of these capable gentlemen only, the grave question of the admission of American pork into Germany was settled; to their vigilance and the assistance of the profession at large the dreaded scourge of pleuro-pneumonia contagiosa, that so effectually put an embargo on the exportation of American beef to Great Britain, was eradicated; through the untiring efforts of the veterinary profession the deadly danger of tuberculosis in the bovine family being transmitted to mankind through the mediumship of beef, milk, and butter has finally been made so manifest that great herds of extravagantly expensive imported cattle have been subjected to rigid examinations by ordinary methods and the application of tuberculin as a diagnostic agent, and in many instances they have been sacrificed to the rendering tank as dangerous to the health of the human race. A large and elegant herd of Jerseys, the property of an ex-Vice-President, and those of many of the fancy dairies supplying milk and butter to aristocratic families of New York and other large cities, have been completely destroyed through the energy of our Government and State veterinarians, aided by and with the sympathy of the medical profession.

We come to you, gentlemen, believing that through your cooperation and sympathy we may procure better and farther-reaching legislation for the protection of our profession, that the line of demarcation between the veterinarian and the empiric may be made broader, and to this end, we believe that with your assistance we may be enabled to prevail on

some future Legislature to create the office of State Veterinarian, whose duty it shall be to guard vigilantly the stock interests of our fair State and see that contagious or infectious diseases that may and do exist among the lower animals, menacing the public weal, be stamped out and not allowed to recur. We think this to be a step in the right direction. To this end is the employment by, or appointment to, this Sanitary Board of a veterinarian, who, through intimate knowledge of the disorders and plagues of the lower animals, would most unquestionably be the means of lightening your labors in no small degree. We further claim that the example of the larger European and Eastern cities in the appointment or employment of a veterinarian on local Boards of Health for the inspection of abattoirs, meat, milk, and markets generally, is of vital importance to the maintenance of good health and to a diminution of the death-rate. This is amply illustrated in the city of Oakland of this State, where an epidemic of typhoid fever was traced to the milk supply. The Board of Health were immediately empowered to take such measures as their judgment dictated; they therefore appointed a veterinary surgeon at a modest salary per year, who actively set to work, and the result is manifest in that, from a city where beef, fish, milk, butter, and vegetables were of questionable purity, it is to-day the best and cleanest victualled city in California.

MEAT INSPECTION.

I am of the opinion that Boards of Health in all instances ought to insist that the beef, pork, and mutton killed and prepared for human consumption should be of animals in the perfection of health, and with that end in view, a veterinary surgeon should be employed as inspector, whose duty should be to examine the animals intended for food, both prior to and after slaughter.

For while the danger is unquestionable, it is an indisputable fact that there frequently is an enormous traffic in diseased meat, and that under the existing order of things, the knowledge of this criminal practice escapes detection from the lack of a proper officer and needed legislation. We know that there is a disposition on the part of many persons to shield the rebukes of conscience that such nefarious work must instigate, with the threadbare excuse that it were a pity that so much material should be allowed to waste. It is quite true that an occasional newspaper report is the source of some alarm to these persons, and for a time renders them cautious, but these reports are infrequent, and give the public but a meager idea of the extent that these infractions on decency occur. It is an indubitable fact that cattle, sheep, and swine are often attacked by diseases that their value would not justify the expense of medical treatment for, and in these instances the services of the butcher are sought to the exclusion of the trouble and expense of treatment, and while we would prefer not to, we are forced to believe that their carcasses find their way to markets and are sold as wholesome food. In my judgment, private slaughter-houses are ordinarily the centers that from their privacy are peculiarly adapted to the perpetration of these atrocious villainies, and hence, in the opinion of those who have given the matter attention, slaughtering should be confined to public abattoirs, where it could be under the immediate supervision of competent veterinary inspectors.

MILK INSPECTION.

There is no question but that the universal use of milk as an article of diet in health and sickness, and its consumption by old and young, render its purity a matter of vital importance. Regarding the inspection of dairies, the same remarks made in reference to the examination of meat are equally or perhaps more strongly applicable. It is undoubtedly the veterinary surgeon's province to diagnose disease in the animal from whence the lacteal secretion is derived and sold for human consumption. The sanitary condition of the dairy and the premises is an important question to be determined, but the health and the vigor of the animals themselves are of more consequence. Unfortunately, tuberculosis is a frequent malady among dairy cows.

For me to comment on the danger of consuming milk, the product of cows affected with this disease, is unnecessary, especially to intelligent medical investigators, and it is sufficient to say that the condemnation and destruction of stock thus affected is the wisest sanitary measure. Further, the sale of milk, the product of cows suffering from any febrile disturbance, should be prohibited. I deem it argumentative to the issue to present for your consideration a few of the contagious and infectious diseases that attack our domestic animals, and are sources of menace, both to the health of man and to the finances of the nation. The dreaded scourge, tuberculosis, which is so fast and surely decimating the human race, has, in the belief of many, its origin in the bovine family, or, if not its origin, at any rate a fertile soil for its multitudinous increase; and while it may not be news to any of you gentlemen, it is certain that if the laymen understood this, and the dire disaster that must naturally follow from the indiscriminate sale of meat, milk, and butter, the product of many dairies affected with this disease, and that in nearly every community in this broad land dairy farms and milk ranches are to be found where tuberculosis not only exists, but fairly runs riot, I take it, that it would be needless to ask for assistance, for the people would, with one accord, not only ask for sanitary legislation, but demand it, and in demanding, would make it one of the issues that aspirants for legislative honors would be compelled to pledge themselves to, before they could expect elective preferment entitling them to a seat in either house. To talk, as has been suggested, of isolating from community and friends the poor, enfeebled consumptive, while mercenary and ignorant men are permitted to sell the products of an old diseased cow, is worse than idle; it is barbarous.

Continuing in this line of reasoning for better sanitary laws, we may mention other cattle diseases communicable to man through inoculation, as actinomycosis, a disease due to a micro-organism, and repeatedly produced in the human family by accidental inoculation of the spore or fungi, actinomyces; also anthrax, or, as it is known in human medicine, charbon, or malignant pustule, and the kindred anthracoid diseases. So might be enumerated other cattle diseases that are either infectious or contagious to our race, as of instances of outbreaks of diphtheria that for a time staggered the medical attendants as to its origin, and which was finally traced to the family cow.

We are continually reminded of the existence of glanders in the horses of this State, and not a few human lives are sacrificed annually through the agency of this terrible malady. Just so long as the laws allow

unscrupulous dealers to barter in this kind of stock and go unpunished, just so long will reputable citizens be ruthlessly murdered and valuable property interests sacrificed to the greed of gold. I refrain from going into details and producing tiresome statistics, as I appreciate the value of time to your honorable body. I shall only briefly call your attention to a few other diseases that are life-destroyers and treasury-depleters, and should be met with safe sanitary laws, administered by officers chosen for their peculiar educational qualifications to recognize them: foot and mouth disease, or epizooty, aptha, rinderpest, trichinosis, and hog cholera, by whose ravages alone the farmers of the United States have sustained a pecuniary loss sufficient to ransom a kingdom.

And now, gentlemen, in thanking you for listening so attentively to my feeble efforts to convince you that an honorable profession seeks your assistance and support in a demand for better laws and more reputable social caste, I trust, if I have appeared in the least aggressive, you will attribute it to an error of the mind, actuated by zeal for what I believe to be a just cause, and not to any intention to be rude, for I am still stinging from a rebuke administered for having had the temerity to read a paper of a veterinary friend's before an association of physicians, one of whom gave as an excuse for non-attendance, that he was chagrined that an association of medical men should allow a "hoss doctor" to bore them with his thesis. If I have succeeded in awakening one sympathetic throb in your hearts for our cause, I am deeply grateful.

GLANDERS AND THE USE OF MALLEIN AS A DIAGNOSTIC AGENT.

By C. B. ORVIS, D.V.S., of Stockton, Cal.

MR. PRESIDENT AND GENTLEMEN: Being entirely unaccustomed to addressing a gathering of physicians, it is with many misgivings that I present the few remarks that I shall make upon this subject.

I am somewhat at a loss to know just what phase of the subject to present, or in what manner to present it, that it may be either interesting or instructive. Should I fail in either or both, I yet hope that it may at least cause some remarks to be brought out that will be productive of good.

While I entertain many doubts, yet I feel highly honored in being invited to present to so intelligent a body as the State Sanitary Convention my thoughts and experience upon a subject of so great importance to our State, both from a pecuniary and a sanitary standpoint.

The existence of glanders in our several localities is far more prevalent than is commonly supposed, it being a disease of so mild a character in many instances that it exists unobserved. In many cases, also, the disease is so obscure that the most expert are unable to make a positive diagnosis, or possibly even a correct one.

There is probably no disease that has given the veterinary profession so much trouble and difficulty in this regard. The tests and experiments to prove the existence of latent glanders have been numerous and varied. The use of drastic cathartics, subjecting the suspected animal to exposure, overwork, etc., with the object to induce acute symptoms, have all been used with usually very unsatisfactory results. If any results were obtained, the time and trouble necessary to bring them about, and the harboring of the suspected animal, so dangerous to both man and beast, that the use of some agent to enable the practitioner to make a positive and speedy diagnosis becomes a positive necessity, as well as one of inestimable value. That we now have an agent that, from the experience of others as well as our own, a practically positive diagnosis of glanders can be made, I am thoroughly convinced. In the use of mallein I feel certain that we have a safe, sure, and reliable agent.

The time has certainly arrived when all veterinarians, and sanitarians as well, should make themselves thoroughly familiar with the uses and value of mallein and tuberculin as diagnostic agents. Every practitioner in the veterinary profession, and especially every State and county veterinarian, should be supplied with a quantity of these agents, for plenty of opportunities for their use will be presented. It seems to me that with proper sanitary laws and competent officers to execute them, with the use of mallein, glanders should be thoroughly stamped out, especially in our rural districts, in a comparatively short space of time. Not only should suspected cases be tested, but all exposed animals should be tested and retested until all diseased animals, whether of an occult or positive nature, have been detected and destroyed.

It is my sincere desire that every physician in this State, more particularly members of Boards of Health, who are not fully informed as to the value of this new agent, should so inform themselves at once. The Boards of Supervisors of the several counties are receiving notices from various parts of their counties of the existence of cases of glanders in those localities. As a rule, no heed is given to these complaints, and in consequence, glanders exists in nearly every township in many of our counties. I am sure the assertion would apply to Stanislaus County, especially where it borders upon San Joaquin, and I have no reason to believe Stanislaus is any more overrun with the disease than many other counties, viz.: Calaveras, Tuolumne, Merced, Fresno, etc.

The transmissibility of this disease to nearly all animals, including man himself, and its certain fatality to all, make it one of the most to be dreaded communicable diseases that originates in the lower animals. That glanders frequently exists in man undetected, I am confident; or if recognized by the attending physician, it is not recorded. Two such instances have come under my observation in Stockton; that is, I suspected the cases, though not admitted by the physicians. I feel confident that if the number of cases of glanders in persons that have existed in our State during the last ten years could be given here to-day, it would be a surprise to every one.

If this be a fact, and I cannot doubt it, we require the aid of this Board, of all local Boards, and of every humanitarian, in every suitable manner to check the spreading of, and finally to eradicate, this dread disease. So, then, we ask your coöperation and influence in this direction. Whether it be done by having made a thorough inspection of the different counties by competent persons appointed by the Supervisors, by the different Boards of Health, or otherwise, it matters not so long as the work is systematically and thoroughly done. I believe it should be governed by State laws, under the direction of a State Veterinarian; but we cannot afford to wait to enact laws and put them into operation. I know of but three counties that have appointed veterinarians, viz.: Santa Clara, Los Angeles, and San Joaquin. In the latter county I have condemned and had destroyed since June 8, 1893, no less than thirty-four horses and mules afflicted with glanders.

In my own observations on the use of mallein, from the samples sent to me by the Bureau of Animal Industry at Washington, D. C., I find fifteen drops about the right quantity to inject, although I have had very good results with less. When a larger quantity is used the local swelling will be quite large in healthy animals, and some rise in temperature will be noticed. Near the center of the neck or the shoulder is the most convenient place to make the inoculation, where any local swelling can be easily noted. The Bureau of Animal Industry send instructions to take the temperature three times the day before the inoculation, every two hours for sixteen or eighteen hours after, and three times on the following days; but I find it often impossible to give the subject so much time, and I find it quite as satisfactory a way to visit the premises in the afternoon, take the temperature of suspected cases, and inoculate them at 10 o'clock P. M., when of course the temperature is again taken; then at 6 o'clock the next morning, or eight hours after inoculation, and every two hours after until 2 o'clock P. M., at which time the temperature will have risen to its maximum.

Local swelling begins as early as one hour after inoculation, and the

temperature in most cases will begin to rise in from four to eight hours. The time that pyrexia begins, or that swelling begins, has no value, so far as I know, as a help in diagnosis.

In very advanced stages of the disease, and where the temperature of the animal is above 101° F. at the time of inoculation, there may not always be any reaction. In fact, in one case which I shall report later on, the temperature fell from $101\frac{1}{2}^{\circ}$ to 98° in fifteen hours.

I have not been able to note as much difference, as some have, in the swelling that exists between diseased and healthy animals. In three healthy animals tested by me, the local swelling was two inches or more in diameter in each case.

Besides pyrexia and local swellings, I have noticed dullness and listlessness, with but little inclination to feed. There is acceleration of the pulse and respiration in proportion to the amount of fever. There is frequently an increase in the discharges from the nose and eyes, in which cases I have seen acute symptoms following.

I will now give you, briefly as possible, the results of my experience with mallein.

My first subject was an animal that had been exposed by being in contact with all the animals on the ranch, seven of which had been destroyed, for being glandered, about one month before the subject became indisposed. The symptoms were those of a sub-acute nasal catarrh, with watery discharges from eyes and nose, with weakness and dejection. On this animal twenty-five drops of mallein was used, which was followed by an increase of only 1° in temperature, without any other signs of reaction. No further symptoms developed. The animal was put to work in about ten days, and has been sound and healthy ever since.

On March 22, 1894, another healthy animal was inoculated experimentally, with practically no reaction. The temperature varied but three fifths of a degree in twelve hours.

My assistant, Dr. Eddy, next used the mallein on four yearlings that had been exposed and showed suspicious symptoms. His experiments were somewhat unsatisfactory, for the reason that he had to take the train for home twelve hours after the inoculation, and also because his patients were not tractable. The restraint they had to undergo and consequent nervousness in taking the temperature, more particularly the first time, was sufficient to cause a rise in the temperature of 1° or more. The temperature was taken the evening preceding the inoculation, and every two hours for twelve hours after inoculation, which took place at 7 o'clock in the morning of February 22, 1894. In three instances the temperature rose 2° higher than at time of inoculation, and the other 1° . By not considering the temperature at 5 P. M. the day before the inoculation, the test would be positive, but by comparing the temperature at 5 P. M., twelve hours after inoculation, with that of the previous day at a like hour, we find two without an increase and the other two with but slight increase, viz.: $1\frac{1}{2}^{\circ}$ and $1\frac{1}{2}^{\circ}$.

But, as before stated, I consider the excitement in restraint by haltering and taking temperature sufficient to account for the high temperature on the evening before inoculation, viz.: $103\frac{1}{2}^{\circ}$, $102\frac{1}{2}^{\circ}$, $101\frac{1}{2}^{\circ}$, and $102\frac{1}{2}^{\circ}$.

I next had an opportunity to test nine cases on one ranch in all stages of development. Of these all but Nos. 8 and 9 had been working

at plowing all day, and they were too emaciated to work at all, which will account for the high temperature of the more emaciated ones, particularly No. 3. This animal was suffering from acute glanders and was very thin. The teamster said that he seemed very tired that day. In each case the temperature was taken at the time of inoculation only, 9:30 P. M., March 28, 1894, some three hours after their day's work had been completed.

In one instance fifteen drops of the mallein were injected, and in the others but ten drops were used. The temperature was next taken at 6:30 A. M., March 29, 1894, or nine hours later, and every two hours following until 12:30 P. M., fifteen hours after inoculation, as shown by the following tables:

No. 1. Bay gelding, about twelve years old. Condition fair. Indications of old ulcers that had healed on septum nasi.

Date.	Hour.	Temperature.
March 28, 1894.	9:30 P. M.	100 $\frac{3}{4}$ ° at time of inoculation.
March 29, 1894.	6:30 A. M.	102 $\frac{1}{2}$ ° nine hours after inoculation.
March 29, 1894.	8:30 A. M.	103 $\frac{3}{4}$ ° eleven hours after inoculation.
March 29, 1894.	10:30 A. M.	103 $\frac{1}{2}$ ° thirteen hours after inoculation.

Maximum increase in thirteen hours, 3 $\frac{1}{4}$ °. Local swelling, 3 inches in diameter.

No. 2. Roan gelding. Age, eight years. Ulcers in both nostrils, and sub-maxillary glands nodulated. Poor and unthrifty.

Date.	Hour.	Temperature.
March 28, 1894.	9:30 P. M.	101 $\frac{3}{4}$ °
March 29, 1894.	6:30 A. M.	101 $\frac{1}{2}$ °
March 29, 1894.	8:30 A. M.	102 $\frac{1}{4}$ °
March 29, 1894.	10:30 A. M.	102 $\frac{1}{2}$ °

Maximum increase in thirteen hours, 1 $\frac{1}{4}$ °.

The Bureau of Animal Industry reports that cases of acute glanders with high temperature at time of inoculation do not always react. The following is another instance:

No. 3. Roan gelding. Eight years old. Ulcers in both nostrils. Poor and unthrifty.

Date.	Hour.	Temperature.
March 28, 1894.	9:30 P. M.	105°
March 29, 1894.	6:30 A. M.	103 $\frac{3}{4}$ °
March 29, 1894.	8:30 A. M.	104 $\frac{1}{2}$ °
March 29, 1894.	10:30 A. M.	102 $\frac{3}{4}$ °
March 29, 1894.	12:30 P. M.	103 $\frac{1}{2}$ °

Maximum decrease in fifteen hours, 1 $\frac{1}{4}$ °.

No. 4. Gray mare. Twelve years old. Quite thrifty appearance. Old scars on Schneiderian mucous membrane. Had glanders five years. I examined this subject five years before for the disease.

Date.	Hour.	Temperature.
March 28, 1894.	9:30 P. M.	100 $\frac{3}{4}$ °
March 29, 1894.	6:30 A. M.	102 $\frac{1}{2}$ °
March 29, 1894.	8:30 A. M.	102 $\frac{3}{4}$ °
March 29, 1894.	10:30 A. M.	104 $\frac{1}{2}$ °
March 29, 1894.	12:30 P. M.	104 $\frac{3}{4}$ °

Maximum increase in fifteen hours, 4°.

No. 5. Chestnut gelding. Very old and poor. Sub-maxillary glands swollen. No ulcers. But little discharge.

Date.	Hour.	Temperature.
March 28, 1894.	9:30 P. M.	99 $\frac{1}{2}$ °
March 29, 1894.	6:30 A. M.	101 $\frac{1}{2}$ °
March 29, 1894.	8:30 A. M.	102 $\frac{1}{2}$ °
March 29, 1894.	10:30 A. M.	102 $\frac{1}{2}$ °

Maximum increase in thirteen hours, 3 $\frac{1}{2}$ °.

No. 6. Gray mare. Condition fair. Mucous membrane injected. Discharge from left nostril and eye. Sub-maxillary glands nodulated.

Date.	Hour.	Temperature.
March 28, 1894.	9:30 P. M.	101 $\frac{1}{2}$ °
March 29, 1894.	6:30 A. M.	101 $\frac{1}{2}$ °
March 29, 1894.	8:30 A. M.	101 $\frac{1}{2}$ °
March 29, 1894.	10:30 A. M.	102 $\frac{1}{2}$ °
March 29, 1894.	12:30 P. M.	103°

Maximum increase in thirteen hours, 1 $\frac{1}{2}$ °.

This animal should have been watched longer, as I believe the temperature would have risen higher; but if no better results could be obtained she should have been inoculated again, a day or two later. She stood beside No. 7, that gave a reaction of 4 $\frac{1}{2}$ °.

In conclusion, I wish to call your attention to experiments of others tending to show the percentage of negative results obtained in employing this agent.

Numerous experiments have been conducted, both in the United States and the old countries, with nearly uniformly pleasing results. In 112 cases inoculated by different veterinarians, 66 gave the characteristic reaction. An autopsy revealed the characteristic lesions of glanders in 63 cases. In two, no characteristic lesions could be found. In one, a formation in the lungs which evidenced in its microscopical character the glanders nodule, but which, when applied to guinea-pigs, give negative results. The autopsy upon the 46 that did not react showed no indication of glanders. This would show less than 3 per cent of negative results. Dickerhoff and Lothers instituted further experiments, with the object in view of determining the effect of lymph when used upon horses afflicted with pleuro-pneumonia, rheno-admites, chronic influenza, guttural pouches, sarcoma of same, etc. None of the animals in the trials were affected by the mallein, and no horse free from malleis exhibited fever reaction, even when receiving three doses of the mallein.

The April number of the "American Veterinary Review," quoting from the "Veterinary Record," reports as follows: "The required test appears to have been discovered in mallein. The employment in subcutaneous injections on 4,450 horses was followed in 562 instances by the characteristic rise in temperature. These 562 animals were slaughtered, and the necropsies revealed unmistakable evidence of the presence of glanders, the existence of which could not possibly have been suspected ante-mortem. In only four cases did the test fail."

This, gentlemen, is the extent of my experience with mallein, and to me it is very satisfactory indeed. I have now become familiar with its use, and in the future I can overcome any of the little discrepancies that I have heretofore met with. By post-mortem examinations I will be able to more conclusively prove that mallein is an agent of inestimable value in the diagnosis of this insidious disease.

Gentlemen, I thank you for your courteous attention.

SANITATION.

By W. W. OATES, Architect, and Inspector of Plumbing and Drainage for the Stockton Board of Health.

From the standpoint of a plumbing inspector, I have been requested to read a paper before this convention. No apology will be necessary at this time, for it will be taken into consideration that writing articles is not the forte of an inspector of plumbing, unless, indeed, he be thrown into daily contact, as we are, with such a one as our honorable President here, who has a happy faculty of dealing with sanitary subjects as stock in trade, in which case it might act as an inspiration. I consider it a great honor to contribute my mite to the object for which this convention is in session. I do not know that the impressions of an inspector of plumbing will reveal anything new to those who, in their interest for the welfare of humanity, have spent years in observation and study of the theories of sanitation; my object then, will be to confine myself to a few thoughts concerning public sewers, house drains, and fixture drains, impressions that have forced themselves upon my mind during a previous experience in the service of a Board of Health. I do not pretend to say to what extent the public health depends upon the condition of sewers and plumbing appliances of our dwellings, factories, and other places, but it is sufficient that the medical world recognizes it to be a fact worthy of much attention, that the vapors and noxious gases arising from the putrefaction of the contents of vaults, cesspools, and sewers are positively injurious to health and conducive to disease. We often meet with proofs that badly-drained and filthy localities are unhealthy ones. It has been stated as a leading principle in the sewerage of cities, towns, and dwellings that "no method of getting rid of human excreta and household waste matters, solid and liquid, can be considered satisfactory which does not provide *against* vitiation of air, contamination of soil, and pollution of drinking water, the most perfect system being that which will provide for the complete, immediate, and rapid removal of all waste matters susceptible of decomposition."

Underground conduits, termed sewers, are most used and accepted as efficient means of immediate disposal of waste matters. A further improvement may be referred to at this time, known as the "separate system," which nearly, if not quite, solves the problem set forth in the above quoted fundamental principle of drainage. I say *if not quite*, not because I have any doubts concerning the correctness of the principles involved in the "separate system," but to take the opportunity to speak of an evil connected with this class of improvements, in the light of my text. I am constrained to believe that in our valley cities and towns a most important feature of sanitation is to provide especially against contamination of soil and the consequent pollution of wells. This is accomplished, so far as open vaults and cesspools are concerned, by the abolition of the same, which is generally done (after much consideration) by the municipal authorities in the case, and after the Board of Health

had repeatedly recited to them the evils resulting to those forced to drink water made impure by the percolation of sewage into wells. Bonds are then issued for a system of sewerage; contracts are let for the execution of the work; but here we are much afraid the chain is broken, and the good advice of the Board of Health is forgotten or disregarded. It is now a matter of dollars and cents and "political pull," if I may use the expression. The political influence referred to means appointment of superintendents who *may* or *may not* have the ability, or, sometimes, *even* a general knowledge of the work in hand. The incompetency of the superintendent may be taken advantage of by the "dollars and cents man," better known as the contractor; and who can blame him? He is not working for the good of the public health, nor for his own *health*, either, for the matter of that, but for dollars. The result is readily seen. A saving of cement means a bad joint; a hurried and careless job, so much *labor lost*; the soil all along the line may become saturated, as by open vaults or cesspools, and our *fancied* security a matter of fancy only. This I believe to be a matter of great importance and demands the attention of every one interested in sanitary science—this convention and the State Board of Health in particular—to devise means whereby this evil may be prevented.

In a report of the State Board of Health of Pennsylvania we read, the other day, a statement made by a city engineer that some sewers, laid only within the past ten years, through incompleteness of construction were over one half filled with the surrounding soil that passed through the joints, and, he adds, that some of them, having been taken up, were found to be exceedingly filthy. Sewers in this deplorable state will not stand pressure from either within or without. Good and efficient flushing is out of the question, since by an adequate flush the water is liable to wash the exterior as well as the interior.

The plumbing inspector, however, is not supposed to have any interest beyond the curb line; therefore, we do not propose to attempt enlargement of the subject of public sewers, but simply to place before this convention this *one* weakness in the ordinary process of the construction of them, with the hope of inciting discussion that may result in educating the public mind to the importance of perfectly sound and serviceable sewers. As a matter of fact, the average citizen knows, or rather understands, far too little of the why and wherefore of the many provisions made in plumbing and drainage to protect the public health.

One of the many impressions naturally forcing themselves on our mind in the daily routine of duty, is how to bring the householder into sympathy with what he is compelled to receive and pay for.

Of the numerous works and reports of Boards of Health, in which are many good and practical explanations of the principles of plumbing and house drainage, the public see few, and consequently is actually in ignorance of the simplest devices for protection against foul air from the sewer. The *house drain* we consider an important feature in house drainage. This should always, where possible, be laid outside the dwelling and in as short a line from the sewer to the water-closets as will be necessary for the proper connecting of the other drainage of the building. It should have a uniform fall and be laid in a trench, the bottom of which should be solid, undisturbed earth. At the end of the drain should be placed a cleaning-out cap, making practical inspection from end to end of the drain. Earthenware drains should not be laid

underneath buildings where the drain cannot be covered to a depth sufficient to prevent any danger from settlement and the consequent escape of sewer air.

Every drain laid underneath a building should remain uncovered thirty-six hours, to permit the cement of the joints to harden, and then be filled with water. This test will be sufficient to prove joints to be water tight or vice versa. This house drain should be ventilated by continuing the drain full size to the roof of the building. A constant current will be caused by an intake of air at some point in the public sewer or by an air inlet on the house side of a trap placed at the property line, through the house drain, up and out the ventilating shaft at the roof of the building.

The trap above alluded to, is for the purpose of disconnecting the sewer from the house drain by the water seal which forms the trap. There exists a considerable diversity of opinion concerning this trap. It has been claimed in separate systems of sewerage that the public sewer would be better ventilated by its omission; the manholes of the public sewers becoming the air inlets, and the house-drain vents of all premises, the outlets or ventilators. We have spent much time in considering this subject, and have drawn the conclusion that while in systems not automatically and sufficiently flushed, the omission would undoubtedly benefit the public sewer, and probably lessen stoppages from improper material passing through, yet, on the other hand, it would necessitate the continuation of the house-drain ventilator in many cases to an extremely unreasonable height to carry the foul air of the sewers to a point of safety. We therefore believe it to be in the interest of the householder to retain the trapped house drain; we would add again, that the drain should be as short as possible, in order to have no long reaches under floors or rooms to become foul and necessitate elaborate ventilation.

In reviewing the plumbing practices of many Eastern cities, where Jack Frost is found regularly "at home" each season, and the plumber is virtually "monarch of all he surveys," we see that it is found necessary to make many provisions not required to be made in this land of sunshine. Indeed, California may congratulate herself on the fact that it is practicable in nearly all cases to maintain the drainage of all fixtures, except closets, completely disconnected from the house drain by the use of hoppers, or by traps furnished with an air inlet on the fixture side of trap, located at the junction of the fixture drain and house drain. Thus, the fixture drain pipe is disconnected from the house drain in the same manner as the house drain is from the public sewer. The fixture is then twice disconnected from the public sewer. It is rulable in Stockton that where these conditions can be carried out, and the fixture drain pipe be not over fifteen feet to the disconnecting trap or hopper, to omit trap ventilation, on the proposition that the decomposition that may take place in fifteen feet of fixture drain pipe, not exceeding two inches in diameter, will be so small that the fixture trap will be a sufficient guard against the entrance of foul air. This rule does not, however, permit the connecting together of several fixture drain pipes without the trap vent, because of the liability to siphonage of one another. The possibility of accumulation of foul air is lowered, at any rate, to a minimum in this manner of dealing with fixture drains.

TUBERCULOSIS; ITS COMMUNICABILITY AND PREVENTION.

By W. F. WIARD, M.D., Member California State Board of Health, President Sacramento City Board of Health, Secretary Board of Examination for U. S. Pensions, and President Sacramento Society for Medical Improvement.

Permit me to submit for your consideration the following facts, conclusions, and suggestions relative to the communicability and prevention of tuberculosis.

A belief in the contagiousness of phthisis has a very ancient historical foundation in some parts of the world, as pointed out by Dr. Peterson, district physician in Copenhagen, who sums up the results of his inquiries as follows: "(1) That a contagious origin of some causes of phthisis cannot on sufficient grounds be denied. (2) That phthisis caused by contagion is in general of a very dangerous and inflammatory character; that it must be justly considered hazardous to sleep in a non-disinfected bed of a phthical patient, and to be habitually in too close contact with such a person; and that this danger, in Denmark, seems to be greatest in the warm period of the year."

Morgagni writes, in 1868: "In Italy consumption has been and still is looked upon as a communicable disease. A consumptive is shunned, and the vessels he may use in eating and drinking are avoided or destroyed, and his clothes burned or buried."

The opinion that long and continuous exposure to the body effluvia of a tuberculous patient puts a non-tuberculous person to the risk of the disease, by a predisposition to it, has been held by Joseph Franks Laënnec, Sir James Clark, and others. Although Sir Thomas Watson explicitly states that he does not believe phthisis to be contagious, nevertheless, for obvious reasons, dissuades the occupation of the same bed, or even the same sleeping apartment, by two persons, one of whom was known to labor under pulmonary consumption.

Dr. Fuller says: "But though the non-infectious character of phthisis be admitted, it behooves the physician to warn the patient's friends of the danger incident to a long-continued attendance on him, especially if the disease be in an advanced stage. It would be the height of imprudence for a healthy person, and especially if young and of a scrofulous diathesis, to sleep in the same bed, or even in the same apartment, with a consumptive patient; for although the malady might not be communicated directly from one to the other, unless possibly under the condition of some tuberculous matter being accidentally introduced into his air passages, or into some other part of his system, the surroundings and the air would be calculated to predispose him to the disease."

Regarding the possible contagious propagation of pulmonary phthisis, Dr. Parker thus expresses himself (having regard to the fact that purulent and epithelial cells have been demonstrated as floating about in the air where numbers of people are together): "Considering that the pleuro-pneumonia of cattle is probably propagated through the pus and epithelial cells of the sputa passing into the air cells of other cattle;

that even in man there is some evidence of a pneumonic phthisical disease being contagious, the floating of these cells in the air is worthy of all attention. It may explain some of those curious instances of phthisis being apparently communicable."

Dr. Villemin suggests "that besides the direct transmission, as by cohabitation, consumption may be contracted through indirect means: by clothes, bed linen, water-closets, the vitiated air of rooms lived in by tuberculous persons, etc." The possible transmissibility of the disease in this manner merits, he thinks, the attention of medical officers of the army. A tuberculous soldier dies in the hospital, and his clothes are returned to his company and worn by another. May not this, he asks, be one source of phthisis in the army? He is satisfied that the barracks is to the soldier, in the production of consumption, what the regimental stable is to the horse in the development of farcy, the contagion and transmissibility of which are at length accepted.

Fournet, who in his work is a non-contagionist, still gives some weight to the "possibility of infection from an atmosphere constantly breathed, and necessarily poisoned, by the consumptive."

Dr. Jules Guerin believes "that crude tubercle can never be contagious, but that when it is softened and the ulcerated lung surfaces are exposed to the air, the patient may become a source of infection to those about him." Just as the pulmonary lesion he has may infect his own organism by resorption of putrid and purulent products.

Dr. Bouillaud says: "During the course of pulmonary tuberculosis, when pus or other products are formed in parts which are accessible to the atmosphere, phthisis, like so many affections in which similar purulent foci happen, becomes indirectly a cause of septic infection."

So much for the opinion of medical men regarding the contagiousness of consumption previous to about 1870. Since then many investigations regarding this matter have been carefully conducted, with the following results and convictions:

It has been proved that rabbits are not infected by association with diseased rabbits, because rabbits do not *expectorate*.

Of one hundred nurses deceased (from statistics based on a record of 87,000), sixty-three died of tuberculosis. It is those especially who dust rooms, make beds, and have charge of the wash that are most exposed.

"Orphan asylums under perfect prophylaxis show no tuberculosis."

"Neuremberg's orphan asylum, with four hundred children, has had but two or three cases of tuberculosis in eight years."

"As to kissing, it is confessed that the disease may be so carried, but not then directly to the lungs, but to the glands about the mouth and neck, to constitute scrofula. Children are especially thus endangered. In hundreds of experiments the lymph-glands nearest the point of infection are affected first. Thus, infection from the mouth, nose, ear, anywhere on the right side, is followed by infection of the glands on the right side. The left remain sound for eight weeks, when they, too, are affected, but the point of infection can always be ascertained with absolute certainty."

"The milk of tuberculous cows was infected in 55 per cent of cases. Milk taken from the healthy udder of a tuberculous cow, diluted definitely with water, injected intraperitoneally into guinea-pigs, lost its virulence; in one case in a dilution of 1 : 40, in another 1 : 50, and in a third 1 : 100. Milk is rendered less dangerous by admixture with other

milk; for the advancing disease in one cow increases the virulence of its milk, while dilution with milk of other cows lessens its virulence. Continued use of so-called warm milk from one cow should be abandoned utterly."

"The dilution of sputum 1:100,000 does not affect its virulence, whether introduced into the body subcutaneously by intraperitoneal injection, or by inhalation. On the other hand, feeding of 32 minims in a dilution of 1:8 gave no positive results."

"In experiments made with pure cultures, positive results were obtained with a subcutaneous injection of 16 minims of a dilution 1:400,000; also with an inhalation of 80 minims of the same dilution beef-peptone-glycerine-agar culture. Pure cultures, therefore, do not lose virulence in a dilution of 1:400,000."

"The subcutaneous tissue, the peritoneum, and the lungs proved about alike favorable to the reception and the multiplication of the tubercle poison, while the intestinal tract was much more resistant; and it was evident that the poison in minimum quantity would not at all affect certain organs. Thus, in intraperitoneal injection, the peritoneum remains perfectly free in two thirds of the cases, while the poison fixes itself and multiplies in the lymph-glands and spleen as much more favorable organs. The sequence of preference is as follows: lymph-glands, spleen, lungs, liver and heart, and lastly, kidneys and genitals."

"After subcutaneous injection an abscess containing bacilli is always formed. The nearest lymph-glands are therefore affected, and later and more slowly the internal organs, especially the spleen."

"After inhalation in more than half the cases the bronchial glands as well as the lungs are found to be affected, and sooner or later the spleen, while other organs, as the liver and peritoneum, remain free."

"The extremely susceptible guinea-pig may remain unaffected by intraperitoneal injections of 16 minims pure culture 1:200,000 dilution; while injection of the same, dilution 1:400,000, may give the positive result in another animal. It is thus shown that milk may be infectious when the scanty bacilli are undiscoverable by the microscope. So that the negative evidence in the examination of sputum does not exclude the disease."

"The finest and truest test is inoculation. The extent and intensity of infection depend directly upon the number of germs introduced."

"Careful and long-continued observation seems to show that the meat of tuberculous animals does not necessarily convey the disease."

Experimental evidence as to the infective character of such flesh varies.

Kastner concludes that the result obtained supports the view that no great amount of danger is to be feared from eating the flesh of tuberculous cattle, unless the tuberculous disease has formed nodules in the flesh—a very rare occurrence. He would, however, boil the meat of such cattle before use.

"Steinheil, experimenting with human flesh, using the psoas muscle of patients who had died of tuberculosis, injected sixteen guinea-pigs, of which fifteen contracted tuberculosis." Steinheil is of opinion that the lungs are the organs from which the infection is carried to the flesh.

"Infection by the alimentary canal occurs usually through fluid food—milk."

The owner of a valuable herd of cattle, finding a large proportion of them were tuberculous—so large a proportion as strongly to suggest infection by association in the sheds—withdrew his milk from market and used it without boiling for fattening his pigs, of which he had a large lot, and on which he prided himself not less than on his cows. The result has been that the pigs have almost without exception been affected with the disease to an extent that has necessitated the slaughter of the whole stock. "Another point of practical interest is that he was not able to discover nodules or other indications of localized tubercles in the cows' udders—a condition still held by some to be necessary to render the milk capable of transmitting the disease." Hence all milk should be boiled.

"The almost universal conviction seems to have been established that tuberculosis pulmonum is caused exclusively by the inhalation of dried sputum."

This, the original postulate of Koch, met its conclusive proof in the studies of Cornet, under his direction. "We know now," says Cornet, "that tuberculosis is caused in the great majority of cases by breathing the dried and pulverized sputum of consumptives. Those persons, therefore, who have to attend daily to the cleansing of rooms and making of the beds of consumptives, and to the removal and cleansing of handkerchiefs and other cloths which have been used as receptacles of the sputum, are more in danger than others of inhaling the bacilli and thus infecting themselves. Therefore, as we have seen, the greatest number of infections occur in these years; with increasing age this work falls upon younger and stronger shoulders, and the danger of infection is largely avoided, for it is not the breath of the consumptive, not the residence in the hospital, which is dangerous, but simply and alone the inhalation of the dried sputum which is mixed with the dust of the floor and the bed, and which, particularly in the morning bed-making and cleansing, is whisked into the air where it is likely to be breathed; we cannot wonder, therefore, that the older members, although they still remain at their duties as attendants upon the sick, are no longer infected so frequently as are those of younger age."

One writer states the tubercle bacilli live in dried sputum one hundred and eighty-six days and the hardy spores often retain life much longer.

The propagation of phthisis in children by means of milk from tuberculous cows most certainly claims serious attention. What part of the appalling percentage of children who die before reaching the age of five years from the effects of the ingestion of milk from tuberculous cows, we will probably never be able to determine, but that it is extremely large seems hardly to admit of doubt. It need not necessarily establish well-marked organic infection to result in a fatal termination. The presence of the bacilli in the extremely sensitive intestinal mucous surface intensifies what would otherwise prove a comparatively harmless enteritis, and without nodules or caseous degeneration may succumb. Foster found that the bacilli of tuberculosis live in milk at least ten days.

"As a result of the investigations of Cornet, the question of inheritance sinks in value more and more; so that while it may be admitted in exceptional cases of internal tuberculosis, it may be probably rejected altogether in the case of phthisis pulmonum." In one set of experiments Sanchez-Toledo injected pure cultures of Koch's bacillus into the

jugular vein of pregnant guinea-pigs, but neither in the blood nor in the organs of the foetuses was he subsequently able to detect any trace of the microbe. Similar negative results followed experiments of injections into the pleural sac or beneath the skin of pregnant guinea-pigs, for although the animals themselves became tuberculous their foetuses were quite free from the infection.

Dr. Brice, of Ontario, in a very able paper on consumption, says: "Popular and professional opinion have both accorded to heredity the principal existing cause, but the most scientific teachings of the present day are that all that is inherited is a tendency due to imperfect development, not of organism in its gross and composite form, but in the structural or cell elements of its tissues. It will be manifest that if the delicate mother has a child weak at birth, it is probable, in the very nature of things, that it will be imperfectly nourished by her, and the innate tendency will be rather developed than lessened. That this is true seems to be borne out by the fact of the enormous number of children dying within the first year or two of birth from tuberculosis of the intestinal tract and neighboring glands."

Quoting from Dr. Roosevelt, in a paper read before the New York Academy of Medicine, February 4, 1892: "Whatever other predisposing or possibly necessarily concomitant factors make possible the terrible misery produced by it, there can be no doubt that pulmonary phthisis would not and could not exist were we able to destroy the bacillus tuberculosis. Hereditary or acquired vulnerability doubtless plays a large part in preparing a fit soil; environment and habits of living—in fact, any number of diverse forces, acting singly or together, may operate in producing phthisis; but it may be safely said that the one primary cause of the dreadful disease is the bacillus of Koch. Without tuberculosis there is no phthisis, and without the bacillus there is no tuberculosis."

"There seems no doubt but consumption is caused by a living, rod-like germ, about $\frac{1}{8000}$ to $\frac{1}{12000}$ of an inch in length and with a breadth $\frac{1}{4}$ to $\frac{1}{10}$ its length. These bacilli multiply by division and also by the formation of spores. Division and sporulation take place slowly, and thus colonies are of slow growth. These bacilli are also difficult of cultivation, because they will only grow in certain media and in the presence of a certain amount of moisture. They do not form spores in the air. The bacillus thrives only within a certain range of temperature—from about 95° to 105° F.; and though they may not be at once killed by temperature above or below this range, they are rendered inactive and incapable of multiplication. They are destroyed by heat over 250° F. A temperature of 107.5° F. continued for several weeks produces the same result. Their growth ceases below 82° F., but cold does not appear to kill the bacillus."

"The most important characteristic of these bacilli is their power of producing tuberculosis in susceptible animals, and this with unerring certainty, whereas the disease is not produced when the bacilli are absent. When they are introduced under the skin or within the cavities of the body, tuberculosis is the invariable result, starting at the point of inoculation and spreading usually along the line of the lymphatics. Finding lodgment in the lungs through inhalation, they produce inflammation, poisoning, and death of the tissues; and consumption is established. These bacilli retain their virulence during months of dry-

ing, and are found alive after long burial in the earth. Professor Koch found light as potent a poison for tubercle bacilli as chemicals, sunlight killing a layer of tubercle bacilli in a few minutes or hours, according to the thickness of the layers. Ordinary daylight will exercise the same effect in from five to seven days."

Dr. Prudden says: "By far and away the most common and abundant lurking place of this germ is the sputum in pulmonary tuberculosis. When the tubercle bacilli are cast off from the body in the sputum they are closely imbedded in a moist, tenacious, albuminous material, from which they cannot escape so long as moisture is maintained, no matter where they lodge or what air currents may blow over them. So that so far as specific contamination of the air is concerned, this cannot occur while the sputum remains moist. This same tenacious envelope also prevents such ready access of disinfectants to the bacilli in the sputum as would assure their easy destruction. When the sputum dries the bacilli are still firmly held in place so long as the desiccated mass remains intact. But let this once be pulverized by the foot, on floor or carpet, by rubbing between folds of cloth, or in any other way, and these virulent particles can mingle at once with other dust and become subject to the same physical laws of transport and diffusion. It is to be distinctly understood that the breath of consumptives, apart from solid particles which may now and then be cast off in coughing, conveys no germ."

"That there are many contributory factors in the acquirement of this disease—vulnerabilities of the individual both hereditary and acquired, predisposing vicissitudes of environment—one cannot, it seems to me, deny, nor should he measure lightly. But the one thing without which tuberculosis cannot come to man or beast, is the living tubercle bacillus. All the vulnerabilities and predispositions and favoring vicissitudes which we either know or can conceive of, cannot, without this particular germ, light up this particular disease. It is not a vapor in the air, it is not a mysterious enzym which does this thing, but a definite physical body which we can see and measure with our lenses; which we can cultivate, and handle, and kill."

"The evidence of the communicability of tuberculosis finds a most dramatic index in the yearly death roll of its victims. Slowly but surely we have learned that what was once thought to be hereditary transmission of the disease, is often only household poisoning, or at most an entailed vulnerability in the presence of the germs, derived from whatever external source. The possibility of extremely infrequent direct hereditary transmission of the tubercle bacillus need have no serious consideration here."

That tuberculosis is infectious, communicable, preventable, admits of no doubt.

Dr. Squire, of London, writes: "The tubercle bacillus has been found in the air of rooms in which phthisical persons are living, and the dust from such rooms has been proved to be infective. I have recently had some glass slides covered with glycerine placed about the wards of the consumptive hospital to which I am attached, and there left for a few days, so that the dust settling from the air might be caught and held by the glycerine. Subsequent microscopical examination of these slides demonstrated the presence of tubercle bacilli derived from the air of the wards."

Dr. Northup writes: "To test the penetrability of the bacilli through the mucous membrane of the mouth of the guinea-pig, Wyssokowitz, of the University of Charcow, rubbed into the mucous membrane of the mouth, having first cleared away all particles of food, tubercular sputum rich in bacilli. By means of a cotton pledget wound upon the end of a sound, he rubbed the sputum into the wall of the pharynx for from one half a minute to two minutes without injuring the membrane; at least, without drawing blood. After twelve days he noted one pea-sized glandular swelling in the neck; on the twenty-fifth day, three swollen glands, and on the forty-fifth day the animal died. On autopsy was found the following: Five lymph-nodes enlarged from the size of a pea to that of a bean, partially or wholly cheesy. There were no other tubercles in the body; the intestines and mesenteric glands were unchanged. Tubercle bacilli were present in all the nodules and cheesy masses." To quote literally a point of interest just now, he says: "But the case aroused the greatest interest for this reason: that even by the most penetrating examination no local change could be demonstrated—either ulceration or thickening or induration—either upon the surface or deep in the mucous membrane of the throat or larynx or in the neighboring part."

Tubercle bacilli enter the respiratory passages with the inspired air, lodge in the mucus of the air passages or the alveoli of the lungs; they may pass through the mucous membrane at any point, be taken into the lymph-spaces, traverse the lymph canal to the nearest nodes, and be retained. Their subsequent career depends upon the power of the tissues to withstand their tendency to grow and reproduce the lesion in which they were bred. According to this power of resistance, they will die or remain inactive for a long period, or will develop nodes known to be scrofulous (on the authority of Wyssokowitz), or may lead on, when the powers of resistance are depressed, to rapidly fatal tuberculosis.

Let us consider briefly a few very probable sources of infection: On the sidewalk of one of the principal streets of the city sits an emaciated consumptive. From broken-down tuberculous lungs, frequent and profuse expectoration is deposited on the pavement. A woman with petticoats sweeping the walk passes along and with careless indifference at least one purulent mass is successfully removed. Arriving at home the skirt is hung in the wardrobe and remains undisturbed several weeks; then it is taken out and dusted for wear again. An only child, a beautiful girl of five years, watches with childish curiosity the process of dusting, inhales the bacilli, and in a few months a physician is consulted for the child's bad cough, which proves persistent, progressive, fatal, and a home is left desolate because a man known to have consumption was allowed to deposit the germ of a disease known to be highly communicable and generally fatal in this manner—a disease which, in this country, in 1890, swept more than 135,000 human beings into premature graves; a disease which, in England, in the twenty-five years ending in 1886, has numbered its 50,000 victims annually; a disease whose prevention, in a great majority of cases, is as certain as its existence.

A faithful servant girl afflicted with phthisis is retained in a family long after the establishment of profuse purulent expectoration—the breaking down of a tuberculous lung. Ignorant of the nature of the malady the children are allowed to play in her room, and often to sleep with her at night, subject to infection from frequent inhalation of the dust of the room, which, without extraordinary care, cannot escape the

presence of the tubercle bacilli. Emaciation speedily follows, a loss of appetite, and a fatal termination of a case of quick consumption often precedes the death of the girl from whose lungs the infection was given off.

A party of healthy people are crossing the continent by rail from the East. A consumptive occupies the same car, and naturally takes a seat near the fire. He has paid his fare and is certainly entitled to the privilege of spitting if he chooses, and he deposits his sputum near the stove, where it rapidly dries, is ground beneath the feet with other dust, and the party is compelled to submit to an insufflation of diseased lung tissue and bacilli. What wonder that the visit to our golden State did not agree with one or more of the party who "took cold" on the trip, and it ran into consumption, and they died within a year!

Living, loving, ignorant lips kiss the infection from the dying tuberculotic, and their doom is sealed, and "The Lord gave and the Lord hath taken away" stands a holy substitute for apathy, carelessness, and ignorance.

"Dr. Dobnolonski, of St. Petersburg, found, after experiments with animals, that tubercle bacilli can infect the organism through the digestive tract without previous lesion, either desquamation or inflammation. Tubercle virus as well as spores can traverse easily the perfectly normal intestinal wall; the contact need not even be prolonged."

Regarding the universality of this terrible pestilence, Dr. Janeway says: "If we were to consider that if we had been able to enumerate the number of persons in New York City with phthisis, at any time during 1890, 16,000 would not have been far from right."

Among 1,000 autopsies, Osler found 275 with tuberculosis; among 8,873 patients in the surgical clinic at Wurzburg, 1,227 were tuberculous, or one seventh.

"The necroscopic statistics of Harris and others show that one third, perhaps over one half, of the people who live to middle age have some form of tubercular infection. And Dr. Williams, of Johns Hopkins Hospital, estimates that tuberculosis of the female generative organs is four times more frequent than generally supposed."

One death from consumption in every six in our country is a low estimate. Let us see what it means: There is nothing more certain than that all who live must die; hence, of our present population of 65,000,000, almost 11,000,000 must sooner or later die of consumption. And we physicians and sanitarians proclaiming this disease communicable—preventable, but practically incurable!

Now the question arises, what are we going to do about it?

Aided by the strong arm of the law compelling quarantine isolation and compulsory vaccination, the death-rate in England from smallpox has been reduced from 1 in 10 to 1 in 50,000 people.

The prospects of a possible invasion of cholera calls out an appropriation by our State of \$50,000, to be used, if necessary, in its suppression; and the State Board of Health given almost unlimited authority to prevent the invasion and spread of a disease, the germ of which can only be "eaten and drunk"; and yet the report of *two cases* of this disease on the Atlantic coast awakened the continent; was flashed to every city and town, and published in every paper; caused the worthy President of our State Board of Health, Dr. C. A. Ruggles, at that time in Massachusetts, to hasten to the scene of infection in New Jersey, and hastily glean the facts from the Surgeon-General and others repre-

senting other State Boards of Health, called there on the same mission, telegraphed Secretary J. R. Laine. Our State, three thousand miles away, was for the present safe; and all this regarding a disease which, with the financial and legislative aid of our Government, and intelligent vigilance on the part of Boards of Health and careful practitioners, ought never to be allowed to gain a foothold in America; while one hundred and fifty to two hundred deaths from consumption a month in our State awakens little interest, is accepted as a matter of course, and "the mourners go about the streets," and themselves, perchance, contract the disease from some ill wind laden with infected dust which blows no one any good.

Now, are we acting in good faith with that humanity in whose interest we are supposed to labor, to longer postpone action in attempts to suppress and in some degree prevent the terrible ravages of this "pestilence that walketh at noon-day" and at night as well; this pestilence which, under certain conditions, pervades the air and the earth, the meat and milk, that is wafted in the gentle zephyr, that may be snuffed from the rose, that steals into our room when we sleep, and haunts our waking hours unrecognized?

Are our ears not yet made heavy with hearing: "It is strange you doctors do not discover something that will cure consumption"?

Shall we remain in apathy, apparently under the hypnotic influence of that beautiful word painting of Charles Dickens, regarding the death of Smike?

"But there were times, and often, too, when the sunken eye was too bright, the hollow cheek too flushed, the breath too thick and heavy in its course, the frame too feeble and exhausted to escape their regard and notice. There is a dread disease which so prepares its victims, as it were, for death; which so refines it of its grosser aspect, and throws around familiar looks unearthly indications of the coming change—a dread disease in which the struggle between soul and body is so gradual, quiet, and solemn, and the result so sure, that, day by day, and grain by grain, the mortal part wastes and withers away so that the spirit grows light and sanguine with the lightening load; and, feeling immortality at hand, deems it but a new term of mortal life—a disease in which death and life are so strangely blended that death takes the glow and the hue of life, and life the gaunt and grisly form of death."

Shall we, standing in the bright light shed on the etiology of this disease by scientific investigators in all parts of the world to-day, remain reconciled to its existence and put forth no effort to stay its mighty ravages?

Shall we remain silent, indifferent, and apathetic when we know that a very large portion of consumption's levy of 135,000 human lives every year in our country can certainly be saved?

The State Board of Health of Michigan has wisely placed consumption on the list of infectious diseases dangerous to the public health. Other Boards of Health are taking steps in this direction. A resolution to the same effect is presented to this convention for action. I doubt not it will receive your hearty indorsement.

The earliest possible recognition of the bacilli in the sputum seems imperative. Hence a microscopical examination of the sputum should be made immediately a suspected case of consumption is called to notice.

That this action will have a tendency to make practitioners more careful and certain, if possible, in their diagnoses of tuberculous patients, need not interfere with the carrying out of this suggestion.

The specific legislation that will best aid us in the suppression and prevention of consumption, is not easily outlined.

That consumptives in State institutions should be segregated and strict attention given to the destruction of the bacilli in any manner given off, seems evident to all.

That indigent, homeless, irresponsible victims of phthisis be required to deposit their excretions and secretions in certain prescribed receptacles, and never allowed to spit in the streets, I believe possible of accomplishment.

That the immediate, literal destruction of any animal proved to be infected, is not requiring too much.

That all rooms, hotels, lodging or private houses, in which death has occurred from consumption, or which has been occupied by a consumptive, be required to be thoroughly disinfected, under the immediate supervision of the local Health Officer, appears urgent and indispensably necessary.

Under the new order of things herein suggested, all delusions of phthisical patients by physicians who, from consideration of policy, or to spare the delicate feelings of their patients, make the statement that theirs is a case of bronchitis simply, will be done away with. However unpleasant and unwelcome the truth may prove in some instances, we believe that only in exceedingly rare cases will it be productive of harm.

That no legislative measures be advocated or employed which shall work hardship, oppress in any way the unfortunate, or offend the sentimentality of reasonable minds, we probably all agree.

Much of the senseless traveling of consumptives will be stopped, and changing of climates will less frequently be advised.

Indeed, since the communicability of consumption has been suggested, it is interesting to note the disinclination on the part of all localities for proclaiming their particular section a paradise for consumptives.

To even suggest to the profession that the duty of educating the masses regarding the communicability of consumption and contributing toward its prevention devolves upon it, appears superfluous and unnecessary. Already all over our land physicians devoted to their calling, anxious to render the best possible service to the race, have had printed at their own expense instructions for the education of the public, and have taken every opportunity to herald this new gospel of salvation. One feels sadly out of place and very ill at ease in attempting to outline to *such* a course of action; but to those who have not interested themselves in this matter we believe it proper to suggest that never in the history of the human race has the conscientious physician felt himself called upon as now to put forth strenuous efforts to stay the progress of this mighty avalanche of woe which has so long held the right of way undisputed.

THE SANITARY CONTROL OF TUBERCULOSIS.

By S. S. HERRICK, M.D., of San Francisco.

The bacillus tuberculosis as the causative agent, and the infectious nature of the various tubercular maladies, are assumed as settled. As to heredity, it is now about time to conclude that this figures mainly, if not entirely, as a predisposing condition. We may also dismiss endemic influences as causative, however much they may affect the prognosis of tuberculosis. There can be no climatic exemption of the inhabitants of Iceland, the Farøe, Shetland, and Hebrides islands, while the same race is scourged by pulmonary phthisis in Scandinavia. Moreover, the Eskimaux have escaped, for the simple reason that they have not been visited by phthisical voyagers.

A few instances, on the other hand, illustrate how certain localities become and remain deadly to their occupants, from constant subjection to the presence of tuberculous emanations in a confined atmosphere. In a certain office in Paris, during eleven years, fifteen out of twenty-three clerks died of tuberculosis. Cornet states that nearly 63 per cent of the deaths among the religious orders devoted to the care of the sick in Germany have been due to tuberculosis; and that in the Prussian prisons, for fifteen years, nearly 46 per cent of the male prisoners died of phthisis. It is certain that the huts of the Eskimaux have no sanitary advantage over these civilized abodes, except absence of tubercular infection. Dr. Flick's observations in Philadelphia during twenty-five years show that many of the houses in the fifth ward had six to eight deaths from this disease, and that over one third of the houses where deaths occurred had more than one case. He states that, during his residence at Blockley Hospital, two out of fifteen of his associates died, and he himself was thought for a time to be a victim, of pulmonary consumption.

The fact that the general progress of curative medicine has failed to reduce materially the fatality of these maladies, which still carry off more than 10 per cent of all who die, proves the necessity of prevention rather than cure. The chief danger exists in the products thrown off from the diseased organs; that is to say, the sputa from affected lungs, the alvine discharges from intestinal tuberculosis, the discharges from scrofulous ulcers, the natural secretions of diseased glands. The sputa of consumptives are more mischievous than all the rest. We know now how these carriers of infection must be dealt with, so as to render them innocuous without serious trouble. It is quite practicable for every affected person within doors to deposit infectious matters in a disinfecting liquid, and when abroad to carry a small receptacle similarly charged; or pieces of thin, unsized paper might be used and then burned.

In the light of knowledge now the common property of the medical profession, and largely shared by intelligent people throughout the civilized world, the time is at hand for our sanitary authorities to act

in this matter. The State Board of Health of Michigan set the example at its meeting held in October, 1893, when the following was adopted:

Resolved, That hereafter consumption (and other diseases due to the bacillus tuberculosis) shall be included in the official list of "Diseases Dangerous to the Public Health," referred to in Sections 1675 and 1676, Howell's Statutes, requiring notice by householders and physicians to the local Health Officer, as soon as such a disease is recognized.

The explanation is added: "The question of isolation of the patient is not mentioned. Its purpose is to secure to the local health authorities and to the State Board of Health information of the location of each case of this most dangerous disease, with the view of placing in the hands of the patient reliable information how to avoid giving the disease to others, and in the hands of those most endangered information how to avoid contracting this disease."

In December last, Dr. Herman Biggs, of the Health Department of the city of New York, made a report, which embodied these recommendations:¹

"1. That a circular be prepared for distribution among the people, setting forth the danger of contagion from tuberculosis, and the fact that the discharges from the lungs of tuberculous patients are not only dangerous to others, but also to the patient afflicted; and also setting forth the danger of expectorating in places where the sputum is liable to be dried and carried by the air in the form of dust.

"2. That physicians and other persons to whom the knowledge of the existence of a case of tuberculosis may come, be requested to report to this department all such cases within seven days of the time when such person comes under observation.

"3. The medical sanitary inspectors should, as a part of their duty, investigate doubtful cases of the disease reported and take specimens of the sputa for diagnostic purposes, the same as is done in cases of diphtheria. These specimens should be transmitted to the Division of Bacteriology for examination, and the Division of Bacteriology should be properly equipped for such examination for the purpose of obtaining definite knowledge upon which the proper sanitary *surveillance* of those suffering from tuberculosis can be based. Upon the verification of the diagnosis, the inspector should visit the physician reporting each case, and request him to fully instruct his patient and the persons with whom he is in contact, concerning the nature of the disease and the danger of its transmission. If the case be reported by laymen, or if the physician prefers that the inspector should assume the aforesaid duty, then the inspector should personally perform this service."

Also: "That this Board urge upon hospital authorities of the city of New York the importance of separation, so far as possible in the hospitals of this city, of persons suffering from pulmonary tuberculosis from those affected by other diseases, and urge that proper wards be set apart for the exclusive treatment of this disease."

And "That the Commissioners of Charities and Corrections be recommended to take such steps as will enable them to have and control a hospital, to be known as the Consumptive Hospital, to be used for the exclusive treatment of this disease; and that, as far as practicable, all inmates of the institutions under their care suffering from tuberculosis be transferred to this hospital."

Likewise it was recommended that the department provide disinfect-

tion in suitable instances, and that proper cuspidors be provided in public places, factories, etc.

It having transpired that the Board of Health of Philadelphia had this subject under consideration, the College of Physicians, at its meeting January 12, 1894, took it up, as proposed by its council, in the following terms:

Resolved, That the College of Physicians believes that the attempt to register consumptives and to treat them as the subjects of contagious disease, would be adding hardship to the lives of these unfortunates, stamping them as the outcasts of society. In view of the chronic character of the malady, it could not lead to any measure of real value not otherwise attainable.

That strict attention on the part of physicians in charge of the individual cases, insisting on the disinfection of the sputum and of the rooms, on adequate ventilation, and on the separation of the sick from the well, as far as possible, will meet the requirements of the situation so far as they practically can be met, and better than any rules that, for diseases so chronic, can be carried out by Boards of Health.

That the College of Physicians respectfully requests that no official action be taken by the Board of Health, except the insisting on disinfection of rooms in which consumptives have lived and died in instances in which such procedure is not likely to have been adopted under the direction of the attending physician.

The following substitute was offered by Dr. L. F. Flick:

Resolved, That we recommend to the Board of Health of the city of Philadelphia the registration and disinfection of houses which have been infected by tuberculosis.

That we recommend to the City Council of the city of Philadelphia the establishment of a municipal hospital for the treatment of persons suffering from tuberculosis.

After thorough discussion of the whole subject the substitute was rejected, and the original resolutions adopted.

In the course of the discussion allusion was made to resolutions adopted at the late meeting of the American Public Health Association at Chicago, asking that registration should be practiced; also to similar action taken in the Section on Hygiene of the Pan-American Congress of 1893, and by the Congress of Tuberculosis at Paris in 1888 and 1891. Dr. Flick stated that under the precautions taken at Berlin, between 1884 and 1891, the mortality from consumption declined from 3.455 per 1,000 of population to 2.811, or .644 in seven years; while in Philadelphia the reduction was .623 per 1,000 in ten years; and in Paris the mortality remains about the same as it was thirty years ago from this disease—4.574 per 1,000. In England instructions have been published, to inform consumptive patients how to avoid dissemination of the infection, by the North London Hospital for Consumptives, the Royal National Hospital for Consumptives at Ventnor, the Manchester Hospital for Consumptives, and the County Borough of Oldham. The Medical Officer of Health of Manchester offers to disinfect gratuitously any house designated by a qualified medical man. The French "Ligue Préventive" has issued instructions to guard against danger from tubercular infection. In Germany disinfection is compulsory in houses where deaths occur from pulmonary consumption.

History repeats itself, and the wise man of old declared: "There is nothing new under the sun." Apropos of this point, Dr. Flick has recalled an extremely interesting experience in Southern Italy.³ In the year 1782 the following regulations were established in the Kingdom of Naples:

"1. That the physicians shall report the consumptive patient, when ulceration of the lungs has been established, under penalty, for the first, of 300 ducats, and, upon repetition, of banishment for ten years.

"2. That an inventory shall be made by the authorities of the clothing in the patient's room, to be identified after his death, and if any opposition shall be made, the person doing so, if he belongs to the lower class, shall have three years in the galleys or in prison; if to the nobility, three years in the castle and a penalty of 300 ducats.

"3. That the household goods which are not susceptible shall be immediately cleansed, and those that are susceptible shall be at once burned and destroyed.

"4. That the authorities themselves shall tear out and replaster the house, alter it from cellar to garret, carry away and burn the doors and wooden windows and put in new ones.

"5. That the poor sick shall be removed to a hospital.

"6. That newly built houses cannot be inhabited before one year from their completion, and six months after plastering and repairing have been done.

"7. That Superintendents of hospitals must keep in separate places clothing and bedding for the use of consumptives."

Other severe penalties were denounced to those who buy or sell objects which had been used by consumptives to servants, members of the family, and to any others who may violate the regulations. The destruction of property and enforced vacation of houses newly built or repaired for six or twelve months were unnecessary, but the segregation of the sick and the disinfection of all articles defiled by sputa were wise provisions. The law remained in force until the amalgamation of Naples and Sicily into the Kingdom of Italy in 1860, but it is not probable that it was strictly enforced, as some of its provisions were unreasonable and harsh.

The testimony of writers toward the end of the eighteenth century indicates that tuberculous diseases were more prevalent in the Neapolitan dominions than elsewhere in Europe, and their mortality is estimated by Dr. Flick at 10 per 1,000 of population in 1782. In 1834 they were reported about as prevalent at Naples as at London and Paris, but in 1848 De Renzi declared that their ravages had greatly abated, though the restrictions had been somewhat relaxed. There is evidence that the mortality from phthisis in Naples was 4 per 1,000 per annum in 1834; but in 1887 it had declined to 1.16 from phthisis and general tuberculosis in the urban population of the Neapolitan territory, while in the same population for the rest of Italy it was 2.20 per 1,000. This decline is the more noteworthy from the greater prevalence of tubercular diseases in the Neapolitan dominions than elsewhere in Italy when the law went into effect, and from the fact that Southern Italy has been largely resorted to by consumptive invalids. Notwithstanding the repeal of the restrictive law in 1860, it is probable that its essential features are still observed as a matter of custom.

But it should not be presumed that the contagious nature of pulmonary phthisis was first suspected in the eighteenth century. Hippocrates supposed heredity to figure in its causation, and was silent on its contagiousness; but contagion is ignored in all his works which have come down to us. On the other hand, Isocrates, his contemporary, speaking of empyema (evidently meaning pulmonary phthisis) indicates that it was then considered contagious. Aristotle and Galen seem to have shared this opinion. Lommins (writing in 1563) regarded phthisical sputa as contagious. Dr. Richard Morton, at the beginning of

the seventeenth century, asserted that consumption may be contracted from a bedfellow, like a contagious fever. Morgagni (1760) expressed his fear of dissecting bodies dead of this disease, on account of its contagious nature. Indeed, Tanner⁴ asserts that, until about 1790, pulmonary phthisis was generally considered contagious. From that date its contagious property rapidly went into discredit until the discovery of the bacillus tuberculosis.

From the foregoing it is manifest that the control of tubercular diseases is a question which this convention should take under serious consideration at the present meeting. In my judgment, the State Board of Health and the local Boards of our State cannot long delay action, and must soon decide upon some line of proceeding. As to the propriety of the health authorities, both State and local, disseminating among the population printed instructions for destroying the sputa and all other discharges containing the tubercular bacilli, there can be no question; nor as to their duty to disinfect apartments and houses whenever requested to do so by the occupants. Further action, looking to the registration and supervision of cases, seems to require legislative authority. Section 394 of the Penal Code, which prohibits the public exposure of any one affected with a contagious disease, except necessary removal to a suitable place, was enacted before the tubercular diseases were included in that list, and probably would not apply in its present terms. Section 3094 of the Political Code provides for reporting cases of cholera, smallpox, scarlatina, and diphtheria, and might be amended so as to include all forms of tuberculosis.

It is not to be presumed that public opinion at present would tolerate any limitation of the personal liberty of tuberculous subjects. The Political Code, for eighteen years, has required lepers to be segregated from the general population, but no one is required to report such cases; and, although the local authorities are commanded to notify the Secretary of State of all such as are kept segregated, no registration has ever been made, and the law nowhere states penalties for violating this act. It is very doubtful whether a law requiring cases of tuberculosis to be reported and registered would meet with even a fair degree of observance at the present time. Probably it would be wiser to wait until the public become better informed on the subject; otherwise we must expect violent opposition from some and passive resistance from the majority. Before the meeting of our Legislature in 1895, the working of the registration plan in Michigan, and perhaps in New York City, may become apparent, so that the State Board of Health may understand how to advise suitable legislation; if not, we can wait two years longer. Sanitary legislation should be somewhat in advance of the popular demand, but cannot succeed in opposition to general sentiment. At any rate, it is competent for this convention to declare its opinion in favor of specific enactments whenever there shall be reasonable prospect of willing observance.

In conclusion, we must not forget that certain domestic animals, especially milch cows, are notably subject to tuberculosis. Recent observations show that nations are affected by tuberculous diseases in proportion to their consumption of milk and its products. Thus the lower class of Egyptians and Chinese are contrasted with the Tartars, though the better condition of the latter apparently gives them the advantage. Somewhat less striking is the exemption of the Moors of northern Africa and the proneness of the Spaniards and Portuguese.

The prevalence of abdominal and intra-cranial tuberculosis among young children, diminishing as milk figures less in their diet, is also instructive. Cows are often seriously diseased before the appearance of cough, fever, and emaciation, but we have recently learned the trustworthiness of the tuberculin test, and it should be resorted to whenever there is cause for suspicion. The simple precaution of boiling milk would be a safeguard, if people could be induced to make it a strict rule; while it has been found that the bacillus tuberculosis is destroyed by exposure of milk to a temperature of 167° F. for ten minutes, or of 158° for fifteen minutes. Investigation by the New Jersey State Dairy Commission has shown, however, that all the constituents of milk are rendered less digestible by the temperature necessary for sterilization.⁵

It is believed by Bang, of Leipsic, that both the milk and the butter of the same, from cows with tuberculous udders, is infectious when used as food;⁶ but I am not aware of any tests yet made with cheese. Yet it would be unsafe to conclude that the milk is free of bacilli when the udders are apparently not affected, for Ernst obtained seven positive results from fourteen inoculations of such milk.⁶

The above considerations make it extremely desirable that the herds of cows which furnish milk to our cities should be kept under strict sanitary surveillance. In Copenhagen the Milk Supply Company, which sells the yield of more than 4,000 cows, is under the direction of experts, who have no share in the profits. The cows are examined every two weeks by veterinarians, and all the milk and cream are filtered.⁵ Until we can have the benefit of such supervision, our safety lies in the sterilization of fresh dairy milk by heat.

¹ *N. Y. Med. Rec.*, Dec. 23, 1893.

² *Med. News*, Feb. 10, 1894.

³ *Trans. Am. Pub. Health Assn.*, 1890.

⁴ *Pract. of Med.*, p. 569.

⁵ *Sajou's An.*, 1893.

⁶ *Sajou's An.*, 1892.

CREMATION AS THE ONLY SANITARY METHOD OF DISPOSING OF THE DEAD.

By W. F. McNUTT, M.D., M.R.C.S. (Edin.), L.R.C.P., Professor of the Principles and Practice of Medicine in the University of California.

It is not within the province of this article to give the history of the various methods of disposing of the dead. It becomes necessary, however, to say a few words on this aspect of the subject, in order to show that the treatment or disposal of the dead is not a matter of ethics, or a question of morals or religion. The methods of disposing of the dead in all countries is a matter of sentiment, superstition, usage, and necessity. But by all civilized peoples it should be dealt with as a purely sanitary measure. A reference to the history is the more necessary, as so many of the English-speaking people look upon inhumation, or burial of the dead, as a Christian rite—part of the Christian religion—and that all other methods of disposing of the dead are only to be practiced by pagan or heathen peoples. While, as a matter of fact, Christian nations do, at the present time, mostly bury their dead, the nation of all others that is most wedded and prejudiced in favor of inhumation, and that has practiced this method for hundreds of years before the Christian religion was ever dreamt of, is the Chinese. Neither history nor tradition reveals any information of the time when the Chinese disposed of their dead by any other method. At the present time their strong attachment for inhumation seems to depend upon the mere superstition that misfortune will follow the family whose dead are not at rest in the ground; and they carry their superstition to the point of insisting that no other ground than that of China can fulfill the requirement. To whatever land he may wander, in whatever land he may die, it is the sacred duty of the surviving friends to see that his bones (at least) find their final resting place in the land of his birth—in the Flowery Kingdom—and near some place that was dear to him in the days of his childhood.

In Japan, cremation is practiced by the Monto sect; but Shintos bury, while the aboriginal tribes in the remote north have been known to dry or desiccate the body, and subsequently bury it. The ancient Peruvians dried the bodies of the dead in the sun, and finally buried them in mounds. A tribe in South Australia places the dead body at the top of their huts, and keep up fires until the body is desiccated, when it is hidden in the trees. Some of our North American Indians dry their dead by exposure to the sun. The Syrians were known to place their dead at the disposal of wild dogs; while the Parsees for hundreds of years have had their "Towers of Silence," upon which they place their dead, and bury only their bones when the birds of prey have devoured the flesh. The Hindoos not infrequently place a dead body on the bank of the river, to be disposed of by river monsters. Many Kaffir tribes give their dead to the wild beasts; the Egyptians embalmed; the Hebrews mostly entombed; while the Hindoos, Greeks, and Romans cremated. Sea-burial is practiced to some extent, especially among island aborigi-

nees, while deep-sea burial has been recommended by several sanitarians to obviate the harmful effects of inhumation. One writer (Viritz) recommended that dead-ships be kept on the coast, and that daily departures be made for mid-ocean, where the bodies shall be committed to the deep. Water burial, however, is not likely to be practiced to any great extent, and many objections might be advanced against it. It has been thought by some that bodies might be petrified; it has been seriously considered in Germany whether bodies might not be encrusted in cement and placed in a cement sarcophagus, and cement in a fluid state poured about it—and all for no better purpose than to find some method of delaying the inevitable decomposition, of delaying the devolvment of the body into its ultimate constituents, which the laws of nature demand, the vegetable kingdom requires, and God himself has willed.

Seeing, then, that it is appointed that all must die, and that dust to dust sooner or later is the inevitable destiny of the body, whether buried in the ground, or deposited in the ocean, or hid away in the cave, or desiccated by heat, or placed upon the hilltop or in the tower of silence for the birds of the air, or exposed to the beasts of the fields, or piled in a Huacas, or burned by fire, or surrounded by the stony sarcophagus, or embalmed in all the balsams of the Orient with all the cunning and knowledge of the Egyptians, is it not, then, wise and reasonable to dispose of the body in the manner that its decomposition will be the least injurious to the living? The decomposition of animal matter on the surface of—or a few feet under the surface of—the earth, in the air, or water is accompanied by odors that are repulsive and horrible, and by gases and micro-organisms that are deadly destructive to human and all animal life. Could we read the cause of every death we would learn that millions of deaths have resulted from the putrefaction of the buried dead. With the recent developments of bacteriology we have learned that micro-organisms are the cause of the acute infectious diseases, and that these insatiable destroyers of human life do not die with their victims, but infest the earth above and about the grave; they find their way to the surface; they come forth more terrible than an army with banners; are scattered broadcast on the wings of the wind, and are carried to and fro by the birds of the air. Science has taught us this lesson, and yet, in obedience to superstition, to usage, and to sentiment, we continue to bury our dead; we fill and surround our cities with putrefying bodies, which contaminate the air we breathe, pollute the water we drink, and poison the food we eat.

If the members of the State Board of Health will permit me, I would like, in this connection, to suggest that they would have an investigation made to determine the relation of the water supply of the State to the burial grounds. Two or three years ago there was an endemic of malignant diphtheria on the Point Lobos road. I found that the families afflicted were using water from a surface well within a few hundred feet of the Odd Fellows' Cemetery. As you all very well know, burial is still permitted in San Francisco, and almost in the heart of the city. The distance from Laurel Hill Cemetery to the City Cemetery, where the indigent and Chinese dead are buried, is but a few blocks. You all perhaps do not know that between these two cemeteries there is a little lake, which is used as a water catch, and water to-day, strange as it may seem, is being served out of that horrible place to the citizens of San Francisco—simply seepage from the two graveyards. A few days ago I passed

through Cloverdale, and noticed that the graveyard was on a knoll on the bank of the Russian River, at the foot of which the citizens pumped their water supply from the river. How many graveyards there are on the banks of this river, and how many towns take their water supply from it, I do not know. The people of the towns and villages throughout the State generally select a hill or knoll near by for the cemetery, without the slightest regard to its relation to their water supply. Probably hundreds of lives are being sacrificed by this unsanitary procedure.

The neighborhood of burial grounds is proverbial for headaches, diarrhœa, and ulcerated sore throats. According to a report of the French Academy of Medicine, the putrid emanation from Pere-la-Chaise, Montmartre, and Montparnasse have caused frightful diseases of the lungs, to which numbers of both sexes fall victims every year. It was proposed by Mr. Forcroy to analyze the foul gases evolved from bodies which had been interred in this over-saturated soil; but no grave-digger would venture to assist in its collection, because it resulted in almost sudden death if inhaled in the concentrated form near the body, and even at a distance, when diluted and diffused through the atmosphere, produced depression of the nervous system and an entire disorder of its functions. Professor Selmi, of Mantua, has lately discovered in the strata of air which has remained during a time of calm for a certain period over a cemetery, organisms which considerably vitiate the air, and which are dangerous to life. When the matter in question was injected under the skin of a pigeon, a typhus-like ailment was produced and death ensued on the third day. According to the Hon. Dr. Lyon Playfair's report to Parliament it is stated: "In most of our churchyards the dead are harming the living by destroying the soil, fouling the air, contaminating water springs, and spreading the seeds of disease. I have officially inspected many churchyards and made reports on their state, which, even to re-read, make me shudder. But the later discoveries of science point more strongly to other dangers, arising still more directly from the burial of the dead. Every year records new facts identifying the causes of certain of the most familiar types of contagious diseases with the presence of minute organisms (bacteria), the absorption of which into the blood, or even in some cases of the alimentary canal, suffices to reproduce the dangerous malady. One of the most deadly scourges to our race, viz.: tubercular disease, is now known to be thus propagated. The poisons of scarlet fever, typhoid, smallpox, diphtheria, malignant cholera are undoubtedly transmissible through earth from the buried body by more than one mode."

The Rev. S. Long, of Calcutta, says: "The Mohammedan cemeteries of Calcutta have long been a crying evil and the nurseries of cholera, fever, and dysentery." Dr. Edmund Parkes, Professor of Military Hygiene in the British Army Medical School, in his work on hygiene, condemns severely the practice of the burial of the dead. "Burying in the ground," he says, "is the most unsanitary of all the plans of disposing of the dead. The air over cemeteries is constantly contaminated and the water in the neighborhood highly impure, hence the dangers to the population in the vicinity of graveyards."

Sir Henry Thompson says: "I affirm that by burning we arrive in one hour without offense or danger at the very stage of harmless result which burying requires years to produce; but an infinity of mischief may happen by burial and none can happen by cremation." It is

estimated that 32,000 deaths occur annually for every million of people. London, with nearly 5,000,000, buries in and about it at least 150,000 annually, and if the body is in the process of decomposition for only about fifteen years, there are about 2,250,000 in the process of putrefaction in the soil of London and its neighborhood. For this purpose over two thousand acres of land are in use. The Bishop of Manchester, when consecrating a cemetery, said: "Here is another one hundred acres of land withdrawn forever from the food-producing area of this country. Cemeteries are not only becoming a difficulty, an expense, and an inconvenience, but an actual danger. I hold that the earth was made not for the dead, but for the living. No intelligent faith can suppose that any Christian doctrine is affected by the manner in which, or the time in which, this mortal body of ours crumbles into dust and sees corruption." Dr. Waller Lewis, in his report on excavations that had been conducted under churches in London, said that "the many phases of decay were varied, horrible, and a disgrace to any civilization." But it is needless to multiply evidence to show that with our present knowledge of the propagation of diseases, to allow a body to be buried in the ground in a city is a criminal assault against the lives of citizens, for which the authorities should be held responsible.

Dr. Koch, the renowned bacteriologist, says: "The blood of animals dying from splenic fever may be dried and stored for years and then pulverized into a powder, and still the disease germs survive with power to produce infection." The only manner of disposing of the dead without injury to the living is by our modern scientific method of incineration. With the history of cremation as practiced by the ancients, by the Orientals, and by other semi-civilized people at present, we do not propose to speak. Science has done much for the nineteenth century; but in no department of thought has it exhibited greater activity or made more progress than in the department which has for its object the discovery of the causes, prevention, and cure of disease. What might be called the renaissance of cremation (that is, the scientific methods at present adopted in Europe and America) was inaugurated in Italy; and most of the literature on the subject is in Italian, the Italians being the first European people to introduce it. It is only about twenty years since Italy commenced cremating, and less than that since the first crematory was built in Germany, France, England, or America; yet in these few years cremation has gained a firm footing in all these countries. The increase in the number of bodies that are being cremated each year is very considerable. Many new crematories are being built in Europe and America, and in conservative England cremation societies and cremations are rapidly increasing.

Most of the objections urged against cremation are the offsprings of sentiment, superstition, and usage. It is called a pagan practice, unchristian, revolting to our senses, etc. Says the Rev. Dr. Howard Henderson, of Cincinnati: "It would be a bold man who would affirm the prescription for a divine mandate for earth-burying or a divine prohibition of cremation. The method employed is a mere matter of custom, and to dogmatize it into a religious creed would be a profanation of ecclesiastical prerogative." The objection that has been recognized by the advocates of cremation as serious is the one that in the case of poisoning all traces of evidence would be destroyed by incineration, and the murderer might go free without even a trial. This objection has

been greatly overestimated; it is not as serious by any means as has been urged by the enemies of cremation and as has been granted by its friends. If a supposed murderer should occasionally get off scot free without a trial, it might not be so serious a matter to taxpayers, or so serious a matter for society, as to have hundreds of murderers who have been fairly convicted of murder by the evidence after a long and expensive trial set free by juries. Again, there is perhaps not one death in ten thousand where there can by any possibility be even a suspicion of poisoning; and again, every health office should have a medical officer at its disposal to verify the physician's certificate as to the cause of death in every case before a permit is given to dispose of the body. If an inquest be considered necessary, or if there be any suspicion of any such necessity, an examination should be made then. Mr. Danford Thomas made a very careful and systematic inquiry in England and Wales as to the number of exhumations for the past twenty years which involved questions of poisonings. He found that the exhumations did not average one yearly; yet the number of deaths in England and Wales is about eight hundred thousand.

Could anything be more absurd than to oppose cremation on the grounds that it deprives the officers of the law of the chances of exhuming a body in cases of suspected poisoning; that it lessens the chances of convicting the murderer? In burying the dead they are but depositing poisonous masses beneath the surface of the earth, which experiment, reason, and science teaches, poisons thousands of living beings. The one who administers poison to his fellow is committing a crime. The authorities who allow the burial of dead bodies in the midst of populated cities are permitting crime. And besides, disinterments are useless, except in the case of mineral poisons. The poisons that are most likely to be used, such as prussic acid, morphine, aconite, strychnine, etc., soon decompose after the burial of the body, and not a trace of them could be found if the exhumation is any considerable time after burial. And it has become almost a constant habit of injecting bodies with embalming fluid before burial, which renders the detection of poisons impossible. Under no circumstances should an undertaker be permitted to embalm or inject embalming fluid into the body, until he has received a permit from the health office for the disposal of the body. The chances of detecting poisons are so lessened by burial, that cremation, instead of protecting poisoners, would render their detection more certain by necessitating greater care on the part of the health department as to the cause of death; let them make an examination at once in every case where the cause of death is not absolutely certain. This disposes of the medico-legal question.

The history of cremation in America is interesting. Crematories, cremation societies, and the number of bodies cremated, are rapidly increasing in the United States. We have two crematories in California—one in Los Angeles, which has been erected since 1887; one in Cypress Lawn, San Mateo County. The latter, though only four months in operation, has cremated nearly a hundred bodies. It is but nine years since the first human body was cremated in the State of New York. At the present time, the United States Government has, on an island in New York harbor, a crematory for the incineration of the bodies of those who die of contagious diseases; while New York City, Buffalo, Troy, and many other cities have their crematories. Many of

the large cities in other States now have their crematories, and it is pleasing and safe to state that inhumation, or earth burial, is beginning to give place to the safer, less expensive, and altogether more desirable method, cremation.

Up to twenty years ago inhumation was the only method of disposing of the dead practiced by Christian nations. Inhumation will never again be the only method practiced by Christians in the disposal of their dead. In the meantime, dead bodies will be deposited in the ground, and in some cases within the city limits, where the putrefaction and micro-organisms will continue to poison the air, the water, and the ground. Thousands of lives will yet be sacrificed to superstition, sentiment, and usage, but at last the fittest, like truth, will triumph. Philadelphia no longer maintains that disgraceful and dangerous plot, viz.: a potter's field. There the indigent dead are cremated. Philadelphia sets a good example and one that should be followed by every city in the United States! Cremationists do not wish to force their method upon any one; they simply want that every one shall be free to choose without prejudice. They do believe, however, that municipal authorities should prohibit the burial of the dead within city limits; that it is criminal to ignore the established facts of science; that every city should cremate its indigent dead; and urge that in case of death from contagious diseases the body should be cremated. Municipal authorities arrogate the right of, and enforce quarantine, to the end that a person suffering from a contagious disease may not propagate it to others. Does the responsibility of the municipal officers cease when the victim of a contagious disease dies? Is it reasonable and just that a body should be disposed of in a manner that will propagate more disease and cause more deaths than could have been possible during the attack of the disease? Humanity, sentiment, and affection dictate that our dead be treated with reverence and respect; but the living demand and are entitled to protection. The sanitarian is contending for pure air, pure water, and pure earth. To those who call incineration revolting, could they once witness the exhumation of a body that has been buried a year or two, they would never be buried themselves, nor advise their friends to be buried. One experience would dispel all sentiment; the mind would ever afterward revolt against the usage. The eye cannot behold, nor the mind imagine, a more repulsive, shocking, or hideous sight. The grave is a horrid, grim, loathesome, charnel house, where worms desecrate the body and feast upon corruption. How abhorrent to the imagination! It would require a Milton or a Dante to depict it. In modern cremation there is nothing repulsive. The body wrapped in white linen is placed in the superheated fire-clay chamber, where no flame comes in contact with it. All that is liquid or putrefiable disappears in a few minutes, and there is left the ashes—which are inodorous, inoffensive, and without the germs of disease—to be placed in the sacred urn and deposited in the columbarium of the church. It is simply a last baptism by incandescent heat; a purification by fire, whereby the corrupt takes on incorruption. As the mortal takes on immortality, so the corrupt takes on incorruption; as the one robs death of its victory, the other robs the grave of its horrors and dangers. Immortality of the soul, incorruptibility of the body—man's final triumph over death and the grave.

PREVENTION OF CONTAGIOUS AND INFECTIOUS DISEASES, WITH SPECIAL REFERENCE TO TUBERCULOSIS.

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Mr. President and members of the Sanitary Convention of the State of California:

As near as philologists and anthropologists can determine, our forefathers came from one of the alluvial valleys in Asia, along the sacred river Oxus, about—I was going to say ten million years ago, but as our western sacred book puts it six thousand years ago, that date will suit our purpose just as well. Prophylaxis at that early date was not up to our nineteenth century standard, although we learn many truths from the writings of the wise men who flourished long before our Christian era. But somehow or other, primitive religions, or metaphysical doctrines, about cosmogenesis and anthropogenesis have been mixed up with the truths of physiology and medicine. One of the ancient books of India—the country which gave us birth and life; the country whose religious superstitions antedate our modern mythology some millions of years; the country which to-day laughs at our so-called western civilization—well, one of this country's ancient volumes confidently asserts that the feet and the sense of sight owe their origin to fire, because walking generates heat, and sight is only possible with the aid of light; the skin owes its origin to air, because the skin is the organ of touch; the ear and the faculty of speech owe their origin to ether, because the power of speech is one of the principal means for the generation of sound, whilst the ear is the only medium by which sound is appreciated and conveyed.

SUPERSTITIONS IN MEDICINE.

From ancient India medicine found its way into Egypt and Asia. The many different gods, in the imaginations of men, have always been, as they are to-day, appealed to in order to cure and prevent disease. The stars came in for their share, not only for the ailments of men, but also for the birth, growth, and destinies of empires. Even animals and idols have their worshippers. In India it is the sacred bull, cow, and monkey; in Egypt, the ibis and the cat; in Turkey, the dog; in Greece and Rome, the sacred snake, seen even to this day, twined about Hygeia's staff as the emblem of the goddess of health.

The talisman and sacred charms are used by millions of people of all nations to prevent disease. In India it is a mark on the forehead, or a sacred string about the neck. In Egypt the sacred beetle holds full sway. In western civilization it is a sacred garment, the remains of some saint, a picture, a flower, or a coin. The Mohammedans are at once healed of all their ills if they can but look upon a hair from their Prophet's beard. The Christians are miraculously cured by a drachm

vial of the water from Jordan, or a relic, real or imaginary, of some departed mortal.

Nor is this all. A large part of our community resort to recalling the spirit of some half-forgotten friend long since dead. Indeed, they even clothe these spirits with flesh, in their own imagination, that a touch may cure disease. Our aborigines practice the casting out of devils, as was done in Egypt and Asia, for the cure or prevention of disease.

Homer describes surgery fairly well, but does not do much for medicine; whilst Hippocrates describes the body as made up of four humors, viz: blood, phlegm, yellow bile, and black bile; a right proportion of which constituting health, improper proportions resulting in disease. Hippocrates also believed in the efficacy of odd and even days for the cure of diseases. Even Galen followed Hippocrates and added a *fifth* structure to the humoral theory. This he called spirit; it passed through all the humors.

From the ancients down to Hippocrates and Galen, and from the fathers of medicine to Paracelsus and Sydenham, our ancient and honorable calling has been filled with superstitions about benign and malignant influences as inexplicable as they are absurd. Nor are all of these theories abandoned at the present time. Consequently, epidemics of contagious and infectious diseases have had, and are still having, full sway.

Even the Mormons of the present day practice incantations and superstitious absurdities for the cure of mortal diseases. A moribund patient is made to swallow some holy olive oil from the Mount of Zion, his body is anointed with some of the same, and the Elders then lay on their holy hands to effect a cure. The latest charm for the cure and *prevention* of disease is the so-called Franco-German ring, made of nickel alloy, which costs about 5 cents and sells for \$2. This you have doubtless seen upon the fingers of hundreds of people. It is said to be an infallible cure for almost anything, but especially so for rheumatism. What can we expect from people with such superstitious and absurd ideas but the rapid spread of disease. Why, there are people living to-day who will tell us that they cure smallpox, or any of the contagious diseases, by means of so-called Christian Science. I recently witnessed one of these so-called cures. A "healer" was praying every half hour, at \$2 50 a prayer, and rubbing with his holy (?) hands the person of a young lady who had double pneumonia. She was in a dying condition when I entered the room, and yet no licensed physician had seen her before.

INFECTION AND CONTAGION.

But enough of this wholesale and criminal superstition regarding preventive medicine. Enough of sacred relics and blessed charms. Away with them and the spirit-healing charlatans. Let us educate the people up to the scientific fact that all infectious and contagious diseases have a specific *materies morbi* which is communicable and *preventable*. It is now generally understood that smallpox is contagious; that vaccination is a prophylactic measure, which should be enforced by State and municipal authorities, and that isolation and disinfection prevent spreading of the disease. Diphtheria, scarlet fever, measles, whooping-cough, cholera, typhoid fever, typhus fever, erysipelas, tetanus, puerperal

fever, septicæmia, and tuberculosis are equally competent to spread and infect the community, and require as careful isolation and disinfection. Without going into the *modus operandi* of infection operative in each disease, as that would carry us beyond the present scope of this paper, suffice it to state

HOW DISEASES ARE CONTRACTED.

According to the eminent biologist, Prof. Wm. H. Welsh, of Johns Hopkins University, the specific micro-organisms of pulmonary tuberculosis, pneumonia, influenza, rabies, and diphtheria are found in the sputum and may be disseminated by it. It is also probable that mumps, scarlet fever, measles, whooping-cough, typhus fever, and smallpox may be taken into the system by inhaling the germs floating in the air surrounding these patients. It is almost certain that typhoid fever, cholera, actinomycosis, dysentery, intestinal anthrax, trichinosis, yellow fever, and tuberculosis are contracted by eating and drinking the germs in contaminated food and water. Whilst puerperal fever, tetanus, septicæmia, oriental pest, rabies, leprosy, anthrax, glanders, erysipelas, osteomyelitis, pyæmia, tuberculosis, cutaneous parasitic diseases, lupus, smallpox, the acute exanthemata, gonorrhœa, and syphilis are contracted by inoculation and absorption.

The breath itself is seldom contagious so long as it is moist, but when it becomes dry, or the bacilli from dried sputum mingle with it, then the breath may become a danger to those who inhale it. Many of these diseases are contracted through insects, such as flies and mosquitoes. This is true of tuberculosis, typhoid fever, anthrax, and cholera.

Sawtschenko found living cholera bacilli in the excrement of flies, which, as we know, may be deposited in food or in drink and on wounds.

Many diseases are contagious by actual contact or inoculation. Tuberculosis is usually contracted by inhalation, or by swallowing the germs in milk or meat, but the disease may also be conveyed by inoculation (as seen in the case of washerwomen), just as syphilis has been conveyed by inoculation on the hands of surgeons.

In human beings foetal infection through the placenta has been observed in smallpox, measles, relapsing fever, syphilis, croupous pneumonia, typhoid fever, anthrax, and Asiatic cholera.

Tuberculosis is probably seldom, if ever, inherited, although Baumgarten vigorously maintains the doctrine.

ISOLATION AND DISINFECTION.

Now that we know how the various diseases are communicated from man to man or from beast to man, and *vice versa*, it behooves us as sanitarians to establish preventive measures, and this can be done by strict quarantine, isolation, and disinfection.

My plan is to isolate the patients in suitable quarters, have special nurses for all these cases, and disinfect everything from the patient down to the air that is breathed.

In acute exanthemata I have found that one half to one per cent of carbolic acid in olive oil or cocoanut oil answers admirably for anointing the patient's body. It allays the itching and prevents the *materies morbi* from floating about and infecting the air. For the living-rooms

I use 1 in 500 of thymol, or 1 in 10 of creasote by means of steam atomization. I saturate the air with these remedies. All the clothing, bedding, etc., should be thoroughly boiled or burned. The dishes used for food should be as isolated as is the patient. Kind friends should be requested to remain at home, and the utmost care taken to prevent spreading the disease. The carpets should be taken up, and all articles of furniture, not absolutely necessary, should be removed. It is always advisable to saturate blankets with 10 per cent of carbolic solution or 1 in 100 of bichloride of mercury, and hang them on the outside of each door. The secretions and dejecta should always be received in solutions of 8 ounces to the gallon of carbolic acid, or 4 ounces to the gallon of chloride of lime. Never allow discharges to be emptied into the sewers until thoroughly disinfected.

In diphtheria, antiseptic gargles and sprays are of great value in destroying the contagium, just as are antiseptic douches and lotions in puerperal fever and sloughing ulcerations. It is of the utmost importance for us as physicians and sanitarians to see that all apartments occupied by patients having any of the communicable diseases mentioned shall be thoroughly disinfected before occupancy by any other individual. The floor and walls must be scrubbed with an acid solution of bichloride, as the ordinary bichloride forms albuminates and becomes inoperative as an antiseptic. Two drachms of the bichloride and two ounces of tartaric acid to each gallon of water forms a good antiseptic wash. The paper on the walls must be removed or painted, and all the linen, bedding, etc., thoroughly boiled or burned. Then subject the room to fumigation by chlorine or sulphurous acid for four hours, after which allow plenty of pure fresh air and sunshine.

CONSUMPTION AND ITS PREVENTION.

Early History.—In 1810, Bayle demonstrated that persons having died of consumption exhibited peculiar grayish nodules in various organs of their body. Laënnec considered these nodules specific of tuberculosis. Virchow named these tubercular deposits cheesy infiltration or caseation. Scrofulous enlargements, such as glands, were later on considered tubercular. In 1865, Villemin discovered that these cheesy tubercular deposits would, by inoculation, produce tuberculosis in healthy animals. Klebs and Cohnheim later on declared that tuberculosis was a specific, infectious disease, contrary to the generally accepted theory of Niemeyer, that consumption in the main was a chronic, non-specific inflammation of the lungs. Later on, Koch, in 1881, isolated the micro-organism which is now proven and accepted by the scientific world as the specific pathogenic germ of tuberculosis.

All wasting diseases of the lungs are not necessarily tubercular. We have chronic bronchitis, bronchorrhœa, chronic cirrhosis of the lungs, abscesses of the lungs, etc., with more or less expectoration, fever, sweating, and emaciation, which are not due to the bacilli tuberculosis; but the vast majority of cases of consumption must be looked upon as tubercular, and if you will look for the bacillus you will nearly always find it.

The Bacilli.—The tubercle bacilli, as you all know, are small rod-like bodies, having a length of about one fourth to one half the diameter of the red-blood corpuscle, so that it requires from 7,000 to 15,000 of these rod-like vegetable bodies, if placed end to end, and from 50,000 to 75,000

of them, if placed side by side, to measure one inch. The interior of these rods contains very minute colorless spots—spots which do not take up the usual stain used for the bacilli. These are the spores—the most dangerous part, as they are exceedingly difficult to destroy. It is more than probable that the bacilli we discover under the microscope in the sputum of a phthisical patient are merely the dead shells or carcasses holding the living spores.

Staining of Bacilli.—The staining of tubercle bacilli is exceedingly simple, and should not be neglected by any physician when in doubt as to the case being tubercular. Spread the sputum on a microscopic cover glass. Pass it through an alcohol flame three or four times, to dry and fix it. Then let the cover glass float, sputum downwards, for a short time in the staining fluid. After taking the preparation out of the fluid, immerse it in a 33 per cent solution of nitric acid in water. This removes all the coloring matter, excepting that which is taken up by the bacillus, which may then be readily seen under the microscope. The staining fluid most in use is composed of 16 per cent aniline oil in distilled water; filter, and add 10 minims of concentrated alcoholic solution of methyl-violet or gentian-violet to one half a watch-glass full of the aniline water, and the staining fluid is complete.

The tubercle bacilli will be found in tubercular sputum, lungs, brain, intestines, spleen, liver, kidneys, glands, scrofulous or tubercular bones, and in the so-called lupus, which is in fact nothing but a tuberculous skin. The bacilli are frequently found in chickens, dogs, monkeys, guinea-pigs, and cattle. The "pearly distemper" of cows is now definitely known to be tuberculosis.

HOW DOES TUBERCULOSIS INFECT MAN?

It is now agreed that tuberculosis cannot, like syphilis, be born in the infant. It must be acquired. Therefore, if acquired it can be and should be prevented.

Dr. Billings says that in consumption the specific germ is very rarely, if ever, transmitted, inheritance giving only a special susceptibility to its action. The effect of occupation and bodily condition also plays an important part. This is proven by Dr. Biggs, who shows that out of every thousand deaths amongst farmers, only 103 die of tuberculosis, whilst out of every thousand deaths amongst printers 460 die of the disease. Fourteen per cent of all deaths is from tuberculosis.

Tubercular diseases play sad havoc in every civilized country in the world:—Statistics show that about *one seventh* of all deaths from all causes is due to this same tubercle bacillus. This fact should be firmly impressed upon the mind of every physician and every sanitarian; also that an acquired disease must be a preventable one. One quarter of all deaths occurring between the age of fifteen and thirty years, according to Dr. Biggs, is due to tuberculosis. This would seem to increase the percentage even more, for many children die in infancy and many people die in old age of causes not tubercular.

During the twenty-five years ending 1886, the average annual deaths in England from consumption reached the enormous number of 50,000. During any one year in the United States over 150,000 people die of tuberculosis! And yet we are bound to admit that the disease is a preventable one. Over 30,000 deaths from tuberculosis occurred in New

York City during the five years ending January 1, 1893, whilst all the other contagious and infectious diseases combined, including smallpox, typhus, typhoid, scarlatina, diphtheria, measles, and whooping-cough, only caused the death of 21,000 during the same period.

WHAT ISOLATION OF TUBERCULOUS PATIENTS HAS DONE.

A hundred years ago a law was enacted in Naples which compelled physicians to report all cases of consumption to the Health Department, under penalty of a fine of three hundred ducats. A second offense was punished by ten years' imprisonment. Thus Naples reduced its mortality of consumption 90 per cent. Improved hygienic conditions and isolation of tuberculous patients in England has reduced the mortality 50 per cent within the last few years. Philadelphia during the last eight years has reduced her mortality from phthisis 20 per cent.

There is every reason to believe that man becomes infected principally from the sputum of phthisical patients. This dries upon the ground, on the floor, linen, and other objects. It becomes powdered, and with the dust particles the bacilli float about in the air. Thus we see how easy it is for infection to take place.

Sternberg says there can be no doubt that a large proportion of cases of tuberculosis in man results from the respiration, by susceptible individuals, of air containing the bacilli in suspension in a desiccated condition. He also claims that the germs of tuberculosis may remain in the air for many months and retain their vitality until they find a favorable soil for multiplication.

WHY WE HAVE PULMONARY TUBERCULOSIS.

The vast majority of cases of phthisis occur in the lungs. Why? Because the germs are breathed in. Inoculation experiments prove that the first expression of the disease takes place at the site of its inoculation. Extension may then be rapid or slow, and become general or remain localized. If inoculation be practiced in the anterior chamber of the eye, the first tubercular nodule will appear on the iris. If it be in the abdominal cavity, we have first a tuberculosis of the abdominal glands and peritoneum. If the bacilli enter a wound or a scratch on the hand, the first manifestation of tuberculosis will be seen in the nearest lymphatic gland. Consequently, if the germs are breathed into the lungs we have first a tuberculosis of the bronchial glands and lungs.

For several years Tappeneiner and others powdered tubercular sputum in the Pathological Institute in Munich and had different animals breathe it. In every case the animal experimented upon became tuberculous. Domestic animals also play an important part in the production of tuberculosis in man. Chickens will eat the sputum of phthisical patients and contract the disease. By eating chickens undercooked, they may communicate tuberculosis to man, although the disease is claimed to be slightly different. Dogs, in like manner, become consumptive, and may readily communicate the disease by licking the mouth. Fissures and excoriations of the skin may also become infected. Meat and milk often spread tuberculosis. Cattle frequently become consumptive. The "pearly distemper," as we have seen, is tuberculosis, and it is estimated

that at least 3 per cent of all cows have the disease. The meat, as has been proven by Strümpell, is competent to communicate tuberculosis by infecting the intestinal glands with the uncooked bacilli. Billings assures us that one half of one per cent of all meat sold for food is tuberculous. More frequently, however, the communication is produced by diseased milk. Pallecke, in "Virchow's Archiv," concludes from a series of experiments that even micro-organisms are found in 50 per cent of human milk. Cow's milk frequently contains bacilli tuberculosis, and nearly always when the udder presents pearly nodules. Sternberg emphatically assures us that tubercular bacilli are frequently, if not *usually*, present in the milk from tuberculous cows. This has also been proven by Ballinger, Hirschberger, Ernst, and others. Sternberg says the conclusion is reached that the milk may contain tuberculous bacilli even when the *udder of the cow is not involved*.

This will no doubt explain why so many children die of tubercular meningitis and consumption of the bowels, and yet we have no systematic scientific examination of milk in any part of California. We have no scientific inspection of any article of food that we consume. Is it any wonder one seventh of our deaths is from tuberculosis? One sometimes wonders how it is so many escape. When any one with a scrofulous diathesis or a weakly strumous tendency inherited from phthisical, sickly, or drunken parents, or those who through former illness or occupation have so far reduced their vital resistance as to be in poor health, it can readily be seen how such individuals may easily become tuberculous. They are certain to breathe in the germs; if not at home from some member of the family, then the air in street cars, railway carriages, churches, theaters, the streets and public highways is sure to contain the bacilli so long as that filthy habit of spitting is permitted. Our modern sweeping-machines are excellent microbe disseminators. Those in San Francisco can be particularly recommended for that purpose.

BACILLI IN AIR AND EARTH.

According to Billings, bacteria are persistently present in the lower stratum of the atmosphere we breathe, just as they are nearly always found in the upper stratum of the earth, especially in graveyards. These statements hold good with the exception of high altitudes, mid-ocean, and polar regions. Tuberculosis is rare over 10,000 feet, and never found over 16,000 feet elevation.

The bacilli most frequently found in the air and in the earth are those of tuberculosis, malignant œdema, tetanus, summer diarrhœa, anthrax, malaria, diphtheria, and cholera.

Dr. Osler has estimated that from one and one half to four billions of bacilli are expectorated daily by every well-marked case of phthisis.

Cornet examined the dust on the floor, on the walls, in the curtains, etc., in houses previously occupied by phthisical patients, and found it teeming with bacilli. When these were injected into guinea-pigs consumption was rapidly established. This is about what we would expect. How could it be otherwise? And yet we move into these houses and occupy the very rooms without knowing or caring who occupied them previously.

In prisons the mortality from consumption often reaches as high as 50 per cent of the total deaths. This is easily explained when we remember that the rooms are infected with the deadly germs.

MARRIAGE OF CONSUMPTIVES SHOULD BE PROHIBITED.

Intermarriage of consumptives is one of the most baneful practices modern civilization countenances. Hundreds of deaths occur annually from this cause alone. Not only are the offsprings weakly and puny, prone to contract tuberculosis from one or both parents soon after birth, but the husband or wife, even if perfectly healthy, will contract the disease from the sick one. I recently saw this exemplified in my own practice: A perfectly healthy young woman of twenty married a consumptive, who died two years later. The good wife was a more or less constant attendant on her sick husband for these two years. At the end of about one year the woman's health failed. I ordered her into the country for rest and change. She went, although loath to go, but only remained away a few weeks; after which I could not persuade her to leave her sick husband. After his death I examined her carefully. The left apex gave evidence of impaired nutrition, prolonged expiration, and harsh breathing. The sputum, which was very scanty, contained bacilli now and again. In fact, she had contracted tuberculosis. She was treated for some months; gained twenty-five pounds in weight. Sent to the southern part of California, returning in about one year. She came back to the city and remained fairly well for about five years. The first thing I knew she was married a second time. Her second husband was a strong, robust man of about twenty-seven, with no phthisical history in his family. About a year or less after her second marriage, the woman's health began to fail. She again consulted me and I found that consumption was reëstablishing itself. The sputum contained millions of bacilli. The apices of both lungs were involved, and she died in less than a year. Now, it is the second husband's turn. Instead of a robust man he has fallen off in weight. His cheeks are no longer rosy and plump, but sallow and thin. He is developing some cough, and although I have not as yet had the opportunity of examining his sputum, I fear he has become inoculated.

Dr. Webber reports a consumptive husband who lost four previously healthy wives from tuberculosis. Another man lost three wives in a similar manner; and four other tuberculous husbands lost two wives each—all contracted from the sick men whom these faithful women nursed.

THE CARE WE TAKE IN BREEDING HORSES AND DOGS.

We go to any expense and care to breed healthy full-blooded horses. Stables of palatial pretensions are erected for them in the most salubrious climates. A veterinary surgeon visits them frequently, inspects their food, and directs their exercise and the hygienic conditions under which they live. Dogs are similarly cared for and tended; and yet, sad to relate, no such care, attention, or prophylaxis is attempted in regard to the human race. It is, indeed, a sad commentary on the value we place on one of God's noblest creation, when we have to chronicle the fact that more care and more thousands of dollars are expended on a horse or a dog than on the life of a human being. The horse and the dog are carefully mated and cared for during gestation, whilst man in any condition is permitted to marry whom he pleases, although loved ones are carried to the grave by the hundreds. And the soil for scrofula and tuberculosis is prepared for generations yet unborn by such unwise, unjust, and unjustifiable marriages.

The wearing of clothing, earrings, etc., previously worn by consumptives, may spread the disease. Laundry women have been known to contract the disease from washing infected clothing. Consumptives occupying public positions, such as clerks in post offices, banks, etc., are dangerous to public health. Clerks in grocery stores and dry goods establishments should not be consumptive, as the dry sputum might easily infect the food and wearing apparel they handle.

IMPURE FOOD.

Fully as dangerous as the foregoing is the matter of impure food. Last year I had the honor of pointing out, in a paper read before the Sanitary Convention of the State of California, that much of our food was unfit for use, as it had not been properly examined. A still greater evil exists in the milk supply of San Francisco and many other cities. I have examined many samples of milk and I am bound to confess that very few of them came anywhere near the standard prescribed in England, Germany, or the standard for pure milk in our own country. But the most dangerous consideration is that of tuberculous milk. Of this I found more than one sample. Several other investigators have corroborated my researches. It is now conceded, and capable of demonstration, that from three to five cows in every hundred are suffering with "pearly distemper," or tuberculosis. Their milk contains the bacilli of the most dreadful foe the human race has to contend against, and yet we have no scientific milk inspection. Butter may also contain the germs, as we know meat does. Who can tell how many cases of *tuberculosis abdominalis* are due to the bacilli-laden milk the infant drinks? Consumption of the bowels is not an infrequent disease in San Francisco, and it has been fully demonstrated that tuberculous milk does produce the fatal disease; not only is this the case with infants, but also with grown people.

Dr. Ollivier reports an instance requiring more than a passing notice. It was in a boarding-school for young ladies. In the course of some little time several of the scholars were taken ill with tuberculosis and removed to their homes. Sanitarians inspected the premises. The plumbing was good, the air was salubrious, and the buildings were properly ventilated. The food and water were found to be wholesome, and no cause could be assigned for the disease. Still one after another came down with abdominal or pulmonary tuberculosis, until the number had reached twelve. Everything had been examined excepting the milk. This was the last article of food thought of, as it was procured from a large dairy not far away. However, upon investigation the milk was found to contain tuberculous germs, and as milk was cheap and presumably healthy the young ladies of the school had been fed upon it *ad libitum*. The cows were next inspected and many of them were found to have "pearly distemper," or consumption. The owner of the herd was forced to withdraw his milk from the market, and not knowing what to do with it, he fed it to his pigs. The records show that even the pigs could not stand the bacilli of tuberculosis, as all died from the disease within a year. Suffice it to say that as soon as healthy or boiled milk was supplied to the young ladies at school there was no more consumption. If any further proof is necessary to convince you that milk may contain the microbes of consumption, I can only add that if you will analyze carefully the milk supply of any large city you are almost

certain to find the bacilli, and if you will inject such milk under the skin of a guinea-pig I can assure you the poor animal will die of tuberculosis in a few weeks.

It is claimed, and rightly so, that if bacilli are introduced into the stomach of a healthy individual, they are usually digested or rendered inert. But how many infants and grown people who drink milk are not healthy? How many have the necessary resisting power? We all know that there are thousands upon thousands of susceptible cases in every large city, and these are the first victims. It is all wrong; it is non-scientific; nay more, it is absolutely criminal to allow such matters to go unchecked. We owe it to ourselves, and to our families, and to the community at large, to enter our solemn protest against the consumption of articles of food, and especially of milk, until they have been carefully and scientifically examined by competent authorities. Every Board of Health should have the power to appoint competent chemists and bacteriologists to investigate this matter, and thus lessen the mortality from tuberculosis.

ISOLATION OF CONSUMPTIVES.

The disposal of consumptives, both living and dead, is another subject of considerable importance. There cannot be the slightest doubt that consumption is communicable from one person to another in the various ways indicated. It therefore cannot be denied that every consumptive becomes a danger to those around him—a danger to public health. What shall be done with him? Shall we, as intelligent physicians, fully aware of the danger, prostrate ourselves before Allah, as do the good Mohammedans in times of cholera epidemics, and say, "Let thy will be done, there is no God but Allah"; or shall we stand calmly by with our hands folded and our faces to the sun, as do the people in India, imploring protection from Brahma and Vishnu, the creator and preserver, that Shiva—the destroyer—does not annihilate us? Or shall we as men imbued with western thought and civilization, and freed from the trammels of oriental and occidental superstitions, assert our rights as teachers of the healing art, and determine what had best be done with the unfortunates who become consumptives? I say, yes. We must protect the public health. In that event we are bound to isolate and care for consumptives, so that the disease does not spread. Naples reduced her mortality from consumption 90 per cent by these means; England, 50 per cent, and Philadelphia, 8 per cent.

California is rapidly becoming the great sanitarium for these unfortunates. If we allow them to come to our shores to seek health, is it not proper that we should protect the healthy? Should we not protect our fair shores, with its sunny and balmy atmosphere, from becoming a cess-pool of contagion and infection? How can this be accomplished? Not by denying consumptives to come to our fair land to be cured, no; but by proper isolation, by properly regulated sanitarium, giving them all the advantages of climate, hygienic surroundings, rationally constructed buildings, and scientific medication.

CREMATION OF CONSUMPTIVES.

What shall be done with those who die of tuberculosis? It is estimated that 32,000 die annually to every million that are living. This means that forty-eight trillion of people die annually, of which one seventh, or three trillions five hundred billions, die of tuberculosis. These figures are almost incomprehensible. At fifty pounds to each consumptive's body there are over one trillion seven hundred and fifty billions of tons of consumptive bodies for burial annually. Fortunately they are not all buried. Many of them are, as they should all be, *cremated*. The bacilli of tuberculosis have been found in old cemeteries in which no inhumation had been practiced for over twenty-five years. Tuberculous bacilli can invariably be found, even on the surface of the soil, in all cemeteries. The earth-worms bring them to the surface, as proven by the experiments of Pasteur and others. It takes from five to twenty years for human bodies to decay. And as millions upon millions of consumptive bodies are continually being added to those already buried, the result must be self-evident, and instead of one seventh of our population dying, as they do now, of tuberculosis, it must of necessity soon become one half. Something must be done, and that before it is too late.

The Mosaic laws direct that all lepers be driven out of their houses and their effects burned. What leprosy was to Moses and his people, and is to-day to the Hawaiians, tuberculosis is to the American people—the greatest scourge the human race has ever encountered.

RULES FOR THE PREVENTION OF TUBERCULOSIS.

Comprehensive and efficient means should be at once adopted for the prevention of tuberculosis. I will recommend the following:

1. Educate the public to a proper understanding of the communicable character of tuberculosis. Teach them how they can avoid contracting the disease themselves, and how they can prevent transmitting it to others.

2. The promiscuous expectoration of consumptives should be prohibited. The sputum should be received into a 10 per cent solution of carbolic acid, or an acid solution of bichloride of mercury, 1 to 100. Should this be impracticable at times, let the sputum be collected on paper napkins or handkerchiefs, which must be burned before they become dry. Under no circumstances should a phthisical patient be allowed to spit on the floor in public places, or on the streets.

3. Let every physician employ systematic bacteriological examination for the early diagnosis of the disease, and let us inaugurate compulsory registration of all cases of tuberculosis.

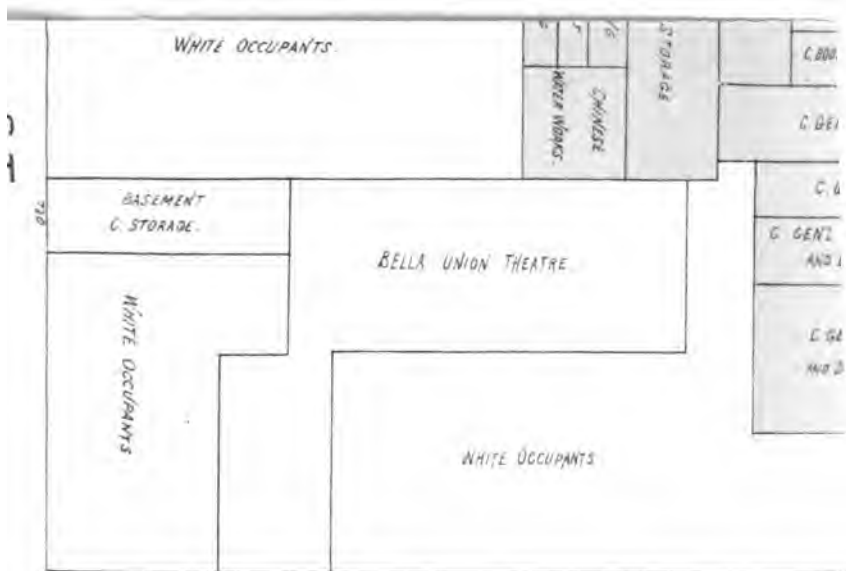
4. It should be made compulsory to have careful and thorough disinfection of all houses, apartments, penal and reformatory institutions, carriages, street and railway cars, theaters, churches, etc., which have been exposed to infection from phthisical patients. The breath of consumptives is not infectious, nor is the sputum, except by inoculation, until it is dried and the bacilli are allowed to float in the atmosphere. For disinfection of rooms I would recommend sulphurous acid gas obtained by burning 1 ounce of sulphur to every 10 cubic feet of space, or chlorine gas. Shut all doors, windows, and crevices for four hours.

PORTSMOUTH SQUARE

KEARNEY ST.

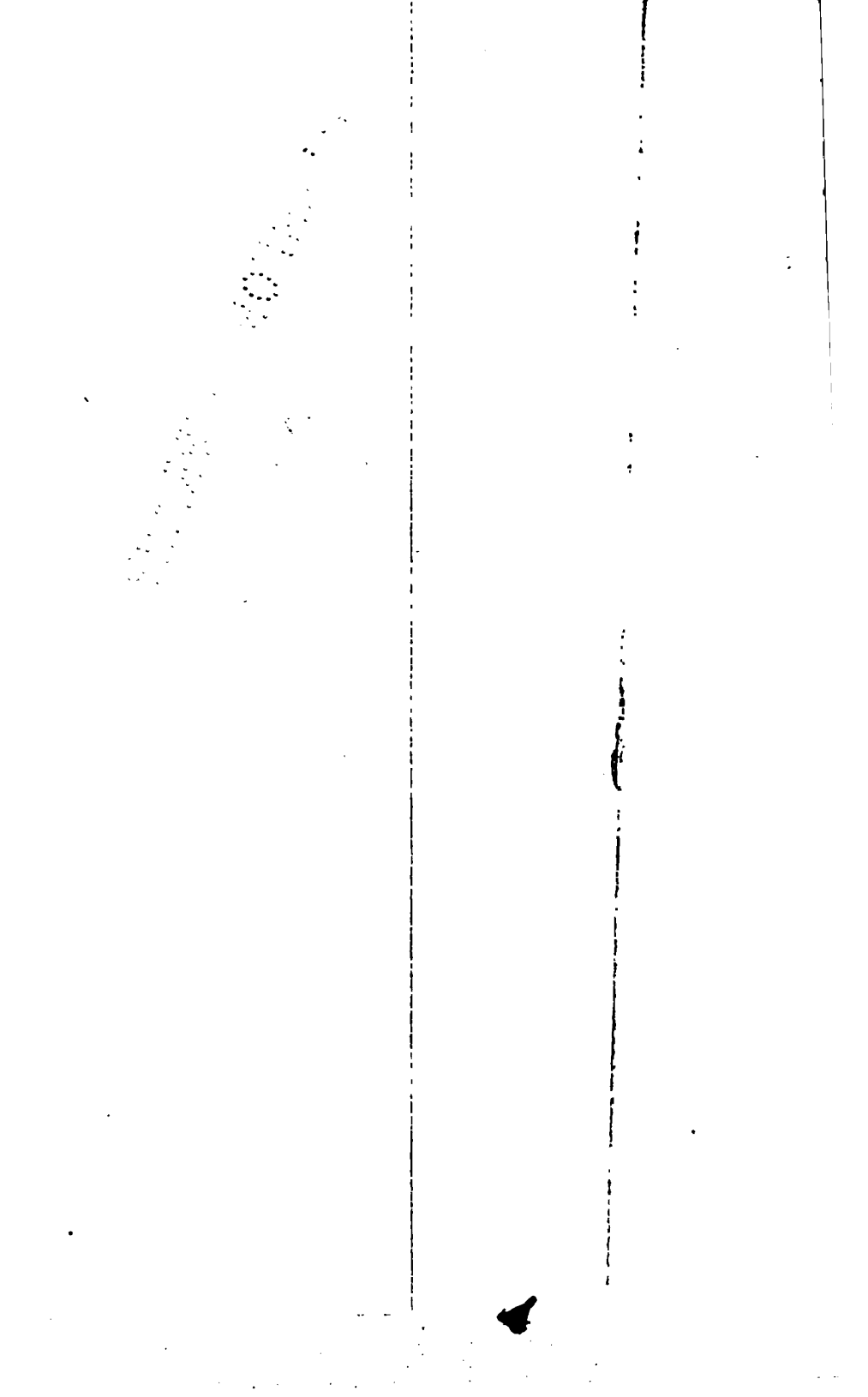
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Then let in the fresh air and scrub the walls, floor, and articles of furniture with the acid bichloride solution: 3ij of bichloride of mercury and 3ij tartaric acid to the gallon, or 3ij of each of the bichloride and permanganate of potassium to the gallon of water. Remove all wall paper if it cannot be washed or painted. Thoroughly boil or steam all bedding, carpets, curtains, etc., for at least one hour.

5. Under no circumstances should the stools of tuberculous patients be emptied into the sewers until they have been disinfected. The intestinal glands are frequently implicated in tuberculosis, and the dejecta often teem with bacilli; therefore, all discharges should be received into a solution of 8 ounces of carbolic acid to the gallon, or 4 ounces of chloride of lime to the gallon of water.

6. Enact regulations prohibiting tuberculous individuals from following vocations that may expose others to the danger of infection. The sputum may dry on their beard, or on their clothing, and thus be disseminated. For the same reason consumptives should avoid kissing, and even hand shaking, to protect those near and dear to them. All dishes and drinking cups should be used by the patient exclusively. They should never be mingled with those in use by other members of the family. The promiscuous use of public drinking cups in schools, cars, streets, and churches cannot be too severely condemned, as contagion is possible from this practice.

7. Tuberculous mothers should not nurse their children. In fact, consumptive people should not be permitted to marry.

8. There should be established careful scientific examinations, under city and State control, of all milk, meat, and other articles of food sold. All animals suffering from tuberculosis, anthrax, septicæmia, glanders, cattle plague, swine plague, sheep-pox, foot and mouth disease, acute pneumonia, actinomycosis, dropsy, and rabies should be killed and at once cremated.

9. Consumptives should always be isolated, and there should be established, under State control, public hospitals and sanitarium for the segregation and isolation of the consumptive poor, where they could live under the best hygienic laws, and receive proper food and judicious medicament.

10. All persons having died of tuberculosis should be at once wrapped in sheets wrung out of bichloride solution, and cremated as soon as practicable. If this be not possible, then they should be buried with quicklime, as the bacilli do not die with their hosts, but have been found in cemeteries from two to twenty-five years after inhumation.

With these simple though efficient precautions I can promise you a reduction of at least 50 per cent in the mortality from tuberculosis during the next ten years.

A PLEA FOR THE PREVENTION OF TUBERCULOSIS.

By GEO. M. KOBER, M.D., of Fort Bidwell, California.

Consumption stands first upon the list of the principal causes of death; it caused 12,059 deaths in every 100,000 from all causes during the census year (Billings¹).

The report of our State Board of Health for the year ending June 30, 1892, shows that this disease caused 2,304 deaths, or nearly one seventh of all the deaths in an estimated population of 1,250,000.

Statistics of consumption include almost as a rule only those who die with lung manifestations, and little is said of the children and others who perish from tubercular meningitis, peritonitis, and other tubercular affections.

Tuberculosis not only leads the list of diseases in order of frequency and mortality, but the loss entailed by the long duration of the disease, and the danger to others from infection, renders the subject of grave importance from an economic as well as a medical point of view.

Whilst it is certainly true that the climate in various sections of this State exerts not only antagonistic, but also curative effects in this disease, we must remember that we have as yet a very sparsely settled State, and that certain regions in Europe, formerly exempt from the disease, have now become infected since intercourse with phthisical communities and subjects has been established.

We have invited for years the victims of consumption to breathe our pure air. In doing so we have exposed others to the ravages of a communicable disease, and it becomes our imperative duty to lessen the danger from infection, and failure to employ every known means of prevention can only be classed as criminal negligence, and I hail, therefore, with great satisfaction the resolution which declares "consumption and its allied diseases as dangerous to the public health." Whilst perhaps few medical men will be found to-day who do not believe that the disease arises either directly or indirectly from a preceding case, yet if we desire to influence legislation in matters of public health, our case should be stated on good evidence and in unmistakable terms.

In view of the importance of the subject, I have collected the following data from reliable sources regarding the contagiousness of consumption:

The classical researches of Koch² have established, beyond a doubt, the infectious character of tuberculosis in animals and man, whether observed in local tubercular deposits or in acute miliary tuberculosis, and that the disease is everywhere caused by a specific microbe, the bacillus tuberculosis.

This bacillus has been found in the system and in all tubercular deposits, and under a high power microscope may be seen to consist of small, usually curved rods, which readily undergo spore-formation. A pure cultivation of these bacilli, when introduced into the body of a healthy animal, produces the disease in question.

The tubercle bacilli have not yet been observed in the soil, water, or atmosphere. Cornet,³ however, demonstrated their presence in the dust and on the walls of rooms inhabited by consumptives, and he, as well as Cadeac and Malet,⁴ successfully inoculated the germs thus found into healthy animals.

Martin, quoted by Dr. Potter (N. Y. Medical Record, February 24, 1894), in examining the dust of one of the most frequented streets of Leipzig, found the tubercle bacillus in about 80 per cent of the specimens.

The bacilli have also been found in the *milk* of tuberculous mothers and cows, especially when the lacteal glands were the seat of the disease, or the system infected with general tuberculosis. This last remark also applies to the presence of the bacilli in the *flesh* of animals used for food; they have also been found in the *blood* of those affected with acute miliary tuberculosis, but only in limited numbers.

Villemin states that the contagious principle has also been found in the *feces*.

According to Uffelmann,⁵ the tubercle bacillus is an obligate parasite which does not develop in the ordinary culture media, but is best propagated in blood serum, glycerine agar-agar, at a temperature of 99° to 100°. If the temperature is below 50° or above 108°, they cease to grow. The resistance of this germ to external influences, especially to heat and cold, is very great. Sormani⁶ has shown that it requires from fifteen to twenty minutes' exposure to steam under pressure, or the same length of boiling, to destroy the vitality of the spores. This same author has demonstrated that completely dried and pulverized sputum retains its infectious character for weeks and months; and Pietro⁷ asserts that tubercular matter will retain its virulence ten months after drying. Putrefaction, so destructive to many bacterial forms, exerts very little influence upon the tubercle bacilli. Sormani and Voelsch⁸ claim that the vitality of the spores remained unimpaired for one hundred and eighty days in the putrefied sputum of consumptives. DeToma,⁹ however, denies this, and found that putrefaction destroys the virulence of the germs after three to nine days.

Dr. Ducor, at a meeting of the Academy of Medicine in Paris (Progrès Medical, April, 1893), reported an epidemic of tuberculosis in a family which had occupied an apartment tenanted two years before by two phthisical patients. He examined pieces of wall paper from the rooms and found Koch's bacillus. Guinea-pigs inoculated with cultures from this paper died of tuberculosis. Cadeac and Bournay, in the Sem. Méd., June 14, 1893, report experiments upon dogs and pigeons which were fed with meat infected with tuberculosis. Examination of their stools revealed the presence of the bacilli, which had lost none of their virulence.

The experiments of Wesener and Falk also indicate that the bacilli resist the action of the normal gastric juice.

The experiments of Koch, Weichselbaum,¹¹ and others prove that artificial tuberculosis can be produced in animals by inhalation of a spray containing tubercle bacilli, by feeding animals with tuberculized food, or by subjecting them to direct inoculation. Indeed, the chain of evidence is quite complete that tuberculosis is caused by the multiplication of this specific micro-organism in the tissues of the animal body, and by no other means.

In man the disease is most likely set in action by the bacilli introduced through the respiratory passages or the digestive tract, and by

the skin and mucous membranes, especially if there be a solution of continuity; but, of course, the most frequent and dangerous mode of contracting the disease is the inhalation of the bacillus suspended in the inspired air.

The evidence as to the transmissibility of bovine tuberculosis to man has been strengthened by Demme," who reports four cases of intestinal tuberculosis in children, infected by the milk of a tuberculous cow, and adduces chemical and anatomical proof of his assertion. When we consider the large mortality of children under five years of age from primary tubercular ulceration of the intestines, tubercular peritonitis, and tabes mesenterica, and the fact that the food of these children consists largely of unboiled milk, we are strongly tempted to believe in the transmission of bovine tuberculosis through the milk supply.

Dr. D. E. Salmon, Chief of the Bureau of Animal Industry, in a paper read before the Pan-American Medical Congress, October 12, 1893, stated that he had no means of estimating the proportion of cases arising from infected food, but declared that tuberculosis is one of the most common diseases of milch-cows, and may affect 50, 75, or 100 per cent of the animals in large herds; the average proportion of cows affected in this country is unknown, but in dairies around our large cities from 3 to 5 per cent have been affected, when the diagnosis was made by the ordinary methods of examination. Fortunately, the milk from all tuberculous cows does not contain the bacilli, but when there are tubercles in the udder, the milk contains immense numbers of these germs. The tuberculin test is proving of immense value in the diagnosis of bovine tuberculosis, and the New York State Board of Health is killing by the hundred animals condemned by diagnoses with tuberculin. A gentleman writes to the "New York Medical Record," January 6, 1894, that his valuable herd of thoroughbred cows was twice examined by competent veterinarians, and pronounced healthy; a third examination with the aid of tuberculin caused a condemnation of over one half the herd, showing that it was impossible for the best veterinarian to discover tuberculosis by physical examination, except in extreme cases. New York, according to the "Record," evidently believes in this kind of diagnosis, and will probably have to pay \$500,000 to eradicate bovine tuberculosis.

Rieck (*Vierteljahrschrift für gericht med. und öffentl Sanitätswesen*, 1892, No. 4) reports the results of the examinations made at the Leipzig abattoir as regards tuberculosis during the years 1888 to 1891, both inclusive. During this time 67,077 cattle were slaughtered, of which 20.4 per cent were found to be tubercular.

The following illustrations of different modes of infection have been reported, viz.:

Lowenthal¹³ reports the case of a woman who slept on the right side of a tuberculous husband, and contracted a conjunctivitis of the left upper eyelid, followed by enlargement and ulceration of the glands in the parotid and submaxillary region. Excision of the original deposit revealed the presence of tubercle bacilli.

Cornil and Moore¹⁴ have shown that infection may take place through the genital mucosa, and an interesting article on chronic tubercular endometritis, referring to primary genital tuberculosis and sexual relations with tuberculous husbands, will be found in the "New York Medical Record," November 30, 1889.

Lehmann¹⁵ reports ten cases in which the virus was transmitted by the mouth of a tuberculous Rabbi, who was in the habit of applying suction to the wound after circumcision. In these cases at the end of the second week ulcerations with a gray base were noticed at the point of infection; four of the children died shortly from tubercular meningitis; three others after a more prolonged illness; one died from diphtheria, and two recovered.

Eisenberg¹⁶ reports a similar case, in which the sputum of the Rabbi was found to contain the bacilli. Tehernig, Pfeiffer, and Duering have reported instances of infection through the skin, in one case by means of expectorated phthisical blood, which infected a slight hand wound of a girl. Landouzy and Martin¹⁷ have shown that inoculation of the spermatic fluid from tuberculous guinea-pigs produced the disease in one third of the animals experimented upon. This would seem to render the transmission of the disease through the sperma probable, but Gärtner (*Zeitschrift für Hygiene und Infectious Krankheiten*, 1893, XIII, 101) believes the direct transmission of the disease to come solely from the mother, for he found it impossible in his experiments on mice, canaries, and rabbits to obtain infected offspring when the mother was healthy, even though the semen of the father was teeming with tubercle bacilli. Under these circumstances, the disease was frequently transmitted to the generative organs of the mother, but never to the foetus resulting from the contact.

Uffelmann believes that the secondary lesions of the alimentary tract may be produced by the patient's swallowing a portion of the expectoration. The most common source of infection of this tract, by means of unboiled milk and insufficiently cooked meat from animals affected with tuberculosis, has already been referred to. There is no evidence to show that the bacilli are transmitted in vaccination; in fact, Acker failed to discover the microbes in question in the lymph visicles of vaccinated phthisical subjects.

There is much reason for believing that the germs of the disease may be conveyed in clothing. I remember a well-authenticated instance where a perfectly healthy man bought the clothing worn by a consumptive, and contracted the disease within six months, and died from the effects two years thereafter. Perlen,¹⁸ in his dissertation on pulmonary tuberculosis and occupation, tells us that of 4,177 tuberculous patients treated in the Munich Poliklinik, 709 were engaged in tailoring, cleansing, and shoe shops. Whilst these figures are suggestive, it is of course impossible to estimate the number of instances in which the disease was spread by dried sputum contained in clothing.

As in other infectious diseases, the question as to whether the germs are introduced *direct*, and in sufficient numbers, is of importance.

The observations of Humphrey, Pollock, and Leudet conclusively show that in well-ventilated wards of chest and consumption hospitals, the disease is not usually found to spread.

In private practice the results are different in this respect. A French committee of investigation presents 213 cases of tuberculosis in which the communicability of the disease was clearly established. In 64 of these cases the disease was conveyed from husband to wife; in 43 from the wife to the husband; in 38 it was transmitted to brothers or sisters; in 19 from parents to the children; in 16 to distant relatives; and in 32 to outsiders. The communicability was most marked among the poorer

classes. Another collective investigation of a German medical society revealed the fact that of 938 married persons who died of acquired tuberculosis, in 101 instances either the husband or wife also contracted the disease. In 8.1 per cent of these cases the husband contracted the disease from his wife, and in 13.2 per cent the wife was infected from the husband. Other statistics might be adduced in favor of the communicability of the disease, but Zasetzky's¹⁸ observation is of special interest. He reports the case of a tuberculous woman who married between 1872 and 1883 three husbands, all previously healthy; the first husband died in 1879 of tuberculosis, the second in 1881, and the third husband, at the time of the report in 1884, was also a victim of the disease, the wife having in the meantime died of consumption.

We can only explain the greater contagiousness in such cases by a more intimate contact, the occupation of the same room and bed, common use of eating and drinking utensils, and the vitiated air of private rooms. It is very possible that the bacilli may acquire more virulent infective powers in the foul atmosphere of overcrowded rooms, and, as suggested by Dr. Ransome, the sporulation of the bacilli may be assisted by contact with the kind of organic matter found in such atmospheres.

Since Cadeac and Malet⁴ have proved that the bacilli are not contained in the breath of tuberculous patients, we must conclude that when found in the air of rooms occupied by phthisical patients, they originate from the dried sputum and other dejections on floors, walls, carpets, bedding, and clothing, which are converted into dust particles, and thus gain access into the air and the respiratory tract. The virus may also be conveyed to others, by small particles of sputum, in kissing, coughing, instrumental manipulations, or adhering to utensils in common use.

From what has been said and written on the subject, it is evident that the tubercle bacilli must be widely scattered; the modes of invasion are also numerous, and the wonder is that, relatively, only a few of those exposed to the virus actually contract the disease. This shows that invasion of these microbes is not sufficient to produce the disease, but that they must also find a susceptible subject for their proliferation and pathogenic effects, and hence *predisposition* in this as in other infectious diseases plays an important rôle.

Clinical experience indicates that faulty nutrition, bad air, lack of sunlight, debility, anæmia, mental anxiety, diabetes, whooping-cough, measles, and other diseases favor the development of tuberculosis.

The observations of Drs. Bowditch of Boston and Buchanan of England positively indicate that damp soils and habitations are predisposing causes to tuberculosis, and whilst this relation has not been satisfactorily explained, still it is possible that the bacilli of tuberculosis luxuriate best in such an atmosphere, as damp rooms are much more likely to contain an excess of organic matter. Another explanation may be found in the well-established fact that a damp air predisposes to catarrhal affections, or "colds," and these in turn may render the system more susceptible to the invasion of the tubercle bacilli. We also know that a predisposition may be *inherited*, as evidenced by a delicate physique, narrow chest, and general vulnerability of the tissues.

A vulnerability of the tissues to the disease may also be *acquired* by dust-producing occupations, and here the origin of the dust seems less important than the character of the particles which compose it. For

this reason, no doubt, the hard, sharp, and angular particles of iron and stone dust are more liable to produce lesions of the respiratory mucosa. In no other way can we explain the comparative innocuity of coal dust, the particles of which are quite free from sharp points and corners. Dr. Ogle has shown in his report—in forty-fifth annual report of the Registrar-General—that coal miners stand at the head of the list as regards freedom from phthisis and other lung diseases in dust-inhaling occupations, and that the tin miners of Cornish, who inhale a sharp, angular, and most irritant stone dust, furnish the largest number of cases. In Switzerland (Lagneau) Medical Record, March 7, 1894, 10 out of 100 stone-cutters died from phthisis, and in England 340 out of 1,000 deaths occurring among these workers were from consumption. We know, of course, that occupations involving the inhalation of an unusual amount of dust tend to produce diseases of the lungs, not necessarily tubercular, but what I wish to emphasize is, that certain dust particles are apt to cause lesions of the respiratory mucosa, and hence an increased susceptibility to the invasion of the tubercle bacilli.

It is also well known that indoor, sedentary, and intellectual occupations predispose to the development of the disease. Of 1,000 deaths in Italy among students and seminarians, 459 died of phthisis. In England, of a like number of deaths in printers, 430 died of phthisis. Raseris' Italian Statistics show that college men and scientists generally furnish the greatest number, and sailors and tramps, the least number of victims to consumption. This indicates the value of out-door life; indeed, statistics conclusively show that it is quite exceptional for this disease to be the cause of death of those who live in the open air. In Switzerland, of 1,000 deaths occurring in out-door laborers and farmers, not more than one or two died from phthisis, and in a similar number of deaths in Italy among shepherds and farmers, only 44 to 54 died from this disease. Lagneau also tells us that the sanitary statistics from 662 towns in France show that the more the population is crowded, so in proportion are the inhabitants gravely affected with tuberculosis. Thanks to the climate of our State, we are permitted to enjoy practically an out-door life all the year around, and it is doubtless this, together with the fact that in many sections of the State, the average temperature is just suited for the performance of the physiological functions with the least possible strain upon any particular organ, which determine the remedial properties of our air. Such climatic virtues cannot fail to promote health and bodily vigor, and, therefore, a natural antagonism to disease.

Does climate afford immunity from tuberculosis? The evidence is not sufficient to show that any community in any climate is entirely free from pulmonary consumption, but we do know that whilst the mortality on the plains and in the valleys of Europe is about 3 per 1,000, and as high as 5 to 7 per 1,000 living in cities and towns, the inhabitants of certain mountainous districts, even under unfavorable sanitary surroundings, suffer to a far less extent—the mortality amounting in some localities at an elevation of 1,500 feet, to only 0.56 and 0.68 per 1,000.

Fuchs, quoted by Uffelmann, gives the following elevations as likely to afford immunity from consumption:

In the north temperate zones, at an elevation of	1,300–3,000 feet.
In the middle temperate zones, at an elevation of	2,000–5,000 feet.
In the tropical zones, at an elevation of	7,000–14,000 feet.

Bell, in speaking of our own country, refers favorably to the eastern highlands, the Alleghany region of Georgia, the Carolinas, Tennessee, Virginia, West Virginia, Pennsylvania, and the White Mountains, especially the pine forest region of the Atlantic States, from Virginia southerly, at an altitude of from 500 to 1,500 feet, and also the Pacific Coast, as notable regions for the small ratio of deaths from pulmonary diseases. In 1886 I called attention to the climate of Northern California and the infrequency of pneumonia and phthisis among the inhabitants of Modoc County, suggesting, in my concluding observations, that the great daily range of temperature, dry atmosphere, and elevation (4,700 feet), might be fatal to the development of the tubercle bacillus. (See Ninth Biennial Report of the State Board of Health, 1886.)

We have seen that the elevation affording immunity differs greatly in different zones; therefore, exemption cannot be attributed to the influence of diminished atmospheric pressure alone, although we must admit that diminished density of the air induces deeper inspirations, more effectual inflation and ventilation of the air vesicles, which naturally tend to increase the resistance of the pulmonary tissues to the invasion of the germs. It is possible that freedom from organic impurities in the air is the most important factor. Pasteur, Tyndall, and others have shown that the air of great altitudes is entirely free from organic impurities; and Miquel, Frankland, Petri, and others have examined the air for bacteria at different altitudes, and found the air at an elevation of between 6,000 and 7,000 feet to be quite free from germs.

Similar investigations have been made of the air of sea coasts and the high seas.

Uffelmann found between fifty to three hundred bacteria in one cubic meter of air on the Baltic coast, in the summer of 1887, and Moreau, Miquel, and Fisher ascertained that the sea air one hundred and twenty miles off the coast is absolutely free from bacteria. These facts throw a flood of light on Bowdin's statistics, which show that whilst the deaths from consumption in the English army were 10.7 per 1,000, the mortality in the navy was only 1.76 in 1,000 men.

PREVENTION OF TUBERCULOSIS.²⁰

The facts presented in the foregoing pages justify the conclusion:

1. That tuberculosis is an infectious disease caused by a microbe, transmissible to healthy individuals under certain favorable conditions.
2. Inherited and acquired predisposition plays an important rôle in the invasion and multiplication of the bacilli.
3. The germs may enter the system by the respiratory and alimentary passages, and by the skin and mucous membranes, if there be an abrasion.
4. That whilst the bacillus has been transmitted through the milk, flesh, and blood of animals and man, the most common and effective way of distributing the disease is by the dried and pulverized sputum of tuberculous patients. Heller calculates that seven thousand two hundred million of bacilli may be expectorated in a day by a single patient.
5. The habitations of consumptives, as well as their personal effects, unless immediate disinfection has been practiced, are infected houses and objects, and liable to convey the disease to subsequent occupants.

The indications for the prevention of this disease are:

1. Notice by householders and physicians to the health authorities as soon as the disease is recognized.

2. The sputum of consumptives should be received in spitcups containing a 5-per cent solution of carbolic acid, and the contents rendered innocuous by boiling for twenty minutes. The paper and wood boxes made for this purpose should be burned. All public and private buildings should be provided with spittoons. Patients who continue out of doors should use handkerchiefs to receive their expectoration, which, if old, should be burned; at all events, linen, bedding, or clothing thus soiled should not be allowed to dry, but must be thoroughly disinfected, boiled, or steamed, and laws should be enacted against spitting into places where the sputum is liable to infect others.

3. Disinfection of all houses in which tuberculosis has occurred should be made compulsory; also the disinfection of hotel rooms, sleeping-car and steamer berths which have been occupied by consumptives.

4. All objects which have come in contact with consumptives should not be given away, sold, or used by others until disinfected by steam under pressure, boiling, fumigation, or a coating with lime or corrosive sublimate solution.

5. Isolation of tuberculous patients is indicated in hospitals, asylums, and prisons. In private life the patient ought to occupy a separate room and bed, use separate eating and cooking utensils, and neither receive nor give kisses, and the family physician should encourage the treatment of such cases in special hospitals.

6. Government inspection of dairies and slaughter-houses, and the extermination of bovine tuberculosis, are urgently called for. In the absence of such laws, and as an additional precaution, cows' milk should be thoroughly boiled and meats well cooked.

7. A tuberculous mother should not nurse her infant, and great care must be taken in the selection of a wet nurse. Marriages with a tuberculous person should not only be discouraged, but absolutely prohibited by law.

8. Predisposed subjects should take special precautions; this is particularly true of those born of tuberculous parents, or belonging to consumptive families; those debilitated by privations or excesses, and those suffering or recovering from whooping-cough, measles, smallpox, diabetes, and catarrhal affections. Clinical experience teaches that it is quite possible to overcome this predisposition by improving the tone and general nutrition of the system. Apart from medication, careful and methodical gymnastics, attention to the skin, and other hygienic rules will prove of special value. Let us insist on the purity of the air in our houses and towns, and guard against dark, damp, and unsanitary habitations.

9. The establishment of sanitary boarding-schools in salubrious localities, for children predisposed to tuberculosis, in which special attention is paid to their physical culture, appears earnestly called for, and in choosing a subsequent vocation for them, it is important to avoid occupations involving sedentary habits and indoor work, especially in a dusty atmosphere.

10. Last, but not least, the public should be educated that this fatal malady is a communicable disease, how it may be acquired and prevented, and this duty devolves not only upon the medical profession, but also upon the press, state, school, and church.

Mr. President, and members of the Sanitary Convention, I am well aware that much mental distress will be engendered by the enforcement of the rules just formulated. But the very fact that 15 per cent of the community are victims of this fatal disease, would more than justify such enlightened legislation as even the prohibition of marriages with a tuberculous person. There is entirely too much sentiment on the subject of individual rights. The annals of medicine teach us, that men and women afflicted with a communicable disease are dangerous to society, and it is the duty of the State to take what precautions it can to prevent mischief.

Legislators have a right to look to our medical societies and health departments for intelligent advice on matters affecting public health, and if a medical body recommends means for the prevention or spread of communicable diseases, they should be accepted in a practical sense and embodied in *effective* laws.

Whilst a conservative spirit should ever animate our profession, we should also possess the courage of our convictions; and yet, there are men eminent in our ranks, whilst not hesitating for a moment to urge the most heroic measures for the prevention of cholera, yellow fever, and smallpox, who absolutely oppose the enforcement of efficient means for preventing the dissemination of consumption, universally admitted to be the most fatal of all communicable diseases. For my own part I fail to see the difference upon which such distinctions are based. Whilst cholera, yellow fever, and smallpox strike terror into a community, because these diseases occur in epidemics and are rapidly fatal, we know that consumption demands more victims than all these diseases combined.

The question of marriage not only involves the prevention of tuberculosis, but other communicable diseases, and no one knows better than the members of the medical profession what an excess of pain and sorrow, what an ocean of tears and blood might have been prevented, if exemption from communicable diseases in candidates for marriage were as mandatory as the question of age and race for the procurement of a license. I believe few men and women will be found unwilling to undergo an examination by their family physician for the detection of infectious diseases, the existence of which not only affects the welfare of a husband or wife, but also their offspring and the community at large, and all those who are so devoid of a feeling of responsibility as to willingly and knowingly inflict a fatal malady upon others, certainly deserve little consideration at the hands of society.

I sincerely hope that this convention will take a progressive step in a question which has occupied and cannot fail to agitate the minds of earnest men and women, and whilst we may meet with opposition, we know our cause to be just, and can confidently rely upon the intelligence and good intentions of the American people, that the cause of humanity will ultimately triumph.

¹ Billings, J. S. Cartwright Lectures, N. Y. Med. Record; December 14, 1889.

² Koch, R. Mittheil: aus dem k. Gesundheitsamte, II.

³ Cornet. Zeitschr. f. Hygiene, V, 191.

⁴ Cadeac & Malet. Rev. de Medicine; 1887, No. 7.

⁵ Uffellmann, J. Handbuch der Hygiene, p. 580; 1890.

⁶ Sormani, quoted by Uffellmann.

⁷ Pietro, quoted by California Health Board; November, 1889.

⁸ Voelsch, in Ziegler's Beiträgen zur pathol. anatomie, II, 2.

- ⁹ De Toma. Centralblatt f. d. med. Wissen, 1888.
- ¹⁰ Falk. Virchow's archiv, 93.
- ¹¹ Weichselbaum. Zeitschr. der Wiener arzte. 1883. 2 Heft.
- ¹² Demme. Jahresbericht des Jennerschen Kinderspitals. Bern, 1882.
- ¹³ Lowenthal. Impftuberculose der Conjunctiva, 1887.
- ¹⁴ Moore. Pacific Record; November 15, 1888.
- ¹⁵ Lehmann. Deutsche Med. Wochenschr.; 1886; Nos. 9 and 10.
- ¹⁶ Eisenberg. Berlin klin Wochenschr.; 1886; No. 35.
- ¹⁷ Landouzy & Martin, in Verneuil Etudes exper. et cliniques. Paris, 1887.
- ¹⁸ Zasetzky. Wrutsch; 1884.
- ¹⁹ Perlen. Lungenschwindsucht und Leruf. München, 1887.
- ²⁰ American Jour. of Med. Sciences; January, 1890; pp. 78-79.

THE RELATIONSHIP EXISTING BETWEEN BOVINE AND HUMAN TUBERCULOSIS.

By R. A. ARCHIBALD, D.V.S., of Sacramento, Cal.

MR. PRESIDENT AND GENTLEMEN: I have availed myself of the opportunity offered by this convention to present for your consideration "The Relationship Existing between Bovine and Human Tuberculosis," a subject which is, in my estimation, the most important which you, as sanitarians, will have to consider in the near future; and having read the notification of this meeting issued by the Secretary, I am lead to believe that this convention intends to take active measures to control this disease.

I have taken up this subject, not with the idea of presenting to your notice anything new or original, nor have I any idea that I can tell you gentlemen anything that you are not already cognizant of, but I simply wish to call your attention and refresh your memory by offering for your consideration a compilation of a few facts and statistics connected with this subject, so that when you come to consider what steps it will be necessary to take in order to suppress and stamp out this disease you will not forget the fact that bovine tuberculosis is identical with human tuberculosis.

I do not propose to enter into the ætiology, pathology, etc., of the disease, but shall confine myself to the origin, transmissibility, the use of tuberculin as a diagnostic agent, and the prevention of the disease.

ORIGIN OF THE DISEASE.

This insidious, delusive disease differs from nearly all other diseases, in that it is not the result of civilization, as many suppose. Barbarous and uncivilized races are affected as severely as many of the most advanced civilized races.

Neither geographical position nor climatic conditions are a factor in the distribution of the disease, notwithstanding that some of our best writers have attempted to account for its prevalence in certain localities by reason of temperature or meteorological influences; nevertheless, every known part of the globe, with a few isolated areas excluded, is a habitat of the disease.

After several years of close study of this affection, and consulting all accessible statistics and the habits of the people where the disease prevails, I have reached the conclusion that the only constant associated factor is found in the bovine species, without any regard to the social position of a community, its geographical habitation, terrestrial or atmospheric condition.

There are undoubtedly conditions of climate, habitations, etc., that favor the development of the disease, if the contagion is present; but this contagion, as I stated before, is most often derived primarily from the dairy cow. Therefore, if a community is closely associated with dairy cattle, tuberculosis prevails.

In establishing proof of the position I have taken in this matter, I would like to give you the history of a great many countries which, before the introduction of the dairy cow, experienced perfect immunity from this disease, but after the introduction of the milch cow into these countries, we have been told by men of undoubted authority that the disease became prevalent.

Owing, however, to my unwillingness to take up too much of your valuable time, I will only at the present cite you a few instances, at the same time assuring you of the fact that I could, if it were necessary, cite you a great number of cases to establish proof of the position taken by me in this matter.

We will take, for instance, the country called the great Kabylia, in Africa, which is occupied by a semi-civilized race of people, who—according to such eminent writers as Hersch, Evans, and other noted French authors—enjoyed an absolute immunity from consumption. According to Morell, Dumas, and other historians, there is no evidence of the presence of the bovine tribe among them; but these people possess large flocks of sheep and goats, and each family has usually one buffalo ox to do its plowing. As these are a peculiar race of people, with peculiar ideas and habits, not calculated to encourage visits from Europeans, they retain their immunity from consumption to the present day. But not so with their neighbors, the Algerians. When this country was first occupied by the French, half a century ago, the natives were enjoying an absolute immunity from tuberculosis, but after the French imported dairy stock in 1854 the statistics of the death-rate by Jackson, in his Medical Climatology, show that consumption was the cause of a large percentage of deaths among the natives.

And there are a great many other countries furnishing reliable statistics of the death-rate from consumption where the disease is not indigenous, but due to importation through the medium of dairy cattle. Such countries, for instance, as Australia, China, Greece, Greenland, central and upper Egypt, Iceland, certain parts of Russia, the Hebrides, and others.

Without going further into details respecting separate communities, let us consider for a moment the statistics of Europe, and there we find the prevalence of tuberculosis is regulated by the ratio of the bovine to the human race. Thus, in Ireland, where the cattle number 4,570,000, nearly an equal proportion to that of the inhabitants, according to Dr. Wyld, consumption is by far the most fatal affection to which the inhabitants of that country are subject. Denmark, with about the same ratio of cattle to inhabitants, sustains about the same rate of consumption. In Portugal, where there are six inhabitants to one bovine animal, consumption attracts so little attention that few notices can be found relating to the disease in that country. In Italy, the distribution of cattle being one to six inhabitants, the mortality reaches an exceedingly low rate. Also in lower Egypt, where the ratio is one animal to about thirty inhabitants, Pruner tells us that the disease is very rare.

Thus the statistics go on, and where exceptions arise the cause is always evident in the condition that influences the breeds of cattle. Taking into consideration all the foregoing facts, there can be little doubt that the inbred species of the bovine race is the prime etiological factor of consumption in the human race. They not only nurse the germ and prevent its extinction, but sow it in the human race continually and abundantly; and when we consider the comparatively few of the human race who are affected, and the immense number who are exposed to the

infection and escape it, we are led to believe that without their aid the germ would die, for of all the germs known none have so hard a struggle for existence in the human family as the tubercle bacillus.

Man cannot generate new forms, but he can so control and interfere with nature's processes as to modify the original design. Inbred cattle are selected, sheltered, and pampered, as they would be unable to withstand the vigorous conditions of the wild state; they propagate earlier, are larger milkers and more efficient beef-producers, and their meat is more delicate and tender than that of the wild animal. All this is achieved by man at the expense of his own health.

THE TRANSMISSIBILITY OF THE DISEASE.

It has been demonstrated beyond a shadow of a doubt by actual investigations, by such eminent German investigators as Gerlach, Villemin, Klebs, Orth, Ernst, Peters, and others, and by such noted American investigators as Salmon, Law, Smith, Schroeder, Pearson, and others, that the milk from tuberculous cows is exceedingly dangerous to the consumer. They have proven this by feeding to such animals as the hog, dog, guinea-pig, and other animals that are not so susceptible as man, the milk from diseased cows, and they have shown that even where the udder of the cow is not affected, the milk is dangerous in 55 per cent of cases.

Now, in regard to the consumption of the meat of tuberculous animals, we realize, so far as becoming inoculated with the germ is concerned, the danger is not very great, for we all are aware that the act of cooking will destroy the tubercle bacillus. But the question of the presence or absence of ptomaines or other toxic elements which are calculated to prove hurtful or even fatal to certain members of the human family, is not for a moment considered. We are constantly met with the argument that tubercle is rare in the muscular system of cattle, and that therefore the muscular tissue may be safely eaten, even though the internal organs are affected. We are also met with the argument that the milk and other dairy products are harmless, so long as the udder is free from tubercle. We admit that if the meat and milk are exposed to the temperature of 100° C., the bacilli are destroyed, but the fact that the germ is destroyed does not, in our estimation, render the produce harmless.

While we are considering the dangers of tubercular infection, we should not lose sight of the no less dangerous element, tubercular poisoning.

Let us for a moment consider this important matter. We all know that Koch's tuberculin has retained a considerable quantity of the toxic matter produced by the growth of the bacillus, after it has been sterilized, and we all know the action of a small dose of tuberculin on a human being or animal suffering from tuberculosis. In such a case the subject may have acquired a tolerance against the products of the existing tubercle to the extent that there is no manifest disturbance of health. But add to these products of the existing tubercle a small quantity of tuberculin, and in ten to fifteen hours the temperature of the subject's body will rise two or more degrees above normal, and the destructive process of the existing tubercle will be accelerated.

It is this extension of tuberculosis under the influence of the toxic products of the bacillus which raises a very important question, which we as sanitarians should on no account overlook. We should remember that all the soluble toxic products of the bacillus are constantly circulating in the blood, and also through the mammary glands, where it escapes

into the milk. Though some may dispute the idea that the germ is carried and distributed through the muscular system, it is impossible to dispute the fact that the product of the germ does find its way to all parts of the body through the circulation. Knowing, then, beyond doubt the presence of the toxins in the flesh and milk, it follows that those who partake of the flesh and milk are continually taking small doses of tuberculin. And if we now consider the prevalence of tuberculosis in the human family, and realize that 12 per cent of deaths in the human family are due to tuberculosis, we see what a fearful risk is being run by the consumption of the meat and milk of animals affected with this disease, even if it could be shown that the products had been sterilized by boiling. This we can readily believe, knowing that sterilization is not a restoration to a non-toxic condition. While it is true that it does away with the possibility of infection, yet it does not render the product innocuous, and it is easy to see that the consumption of these products is a direct means of sealing the fate of a large proportion of a community which is already slightly affected with consumption.

We know that the sputa of a consumptive person is one of the most prevalent mediums of infection to his fellow men, but we overlook the fact that while tuberculous cattle cannot expectorate, yet owing to the pendent position of the head the discharge is continually dropping on the ground; it then dries up and is sown broadcast over the country by the wind.

The milk obtained from the family cow is a source of even greater danger than the milk obtained from dairies, for the reason that dairy milk, even though some of it may have been taken from the udders of tuberculous cows, loses, to a certain extent, a great deal of its virulency when mixed with milk from healthy animals.

TUBERCULIN AS A DIAGNOSTIC AGENT.

I am sure it is unnecessary on my part to enter into a detailed description of tuberculin, for the reason that I believe you gentlemen are familiar with its composition, etc. Not to be too prolix, it will suffice to say, then, that tuberculin is the substance which was claimed by Koch to have curative properties in the treatment of tuberculosis. As a curative agent we know it was a failure; as a diagnostic agent, however, it has given results which have in many respects revolutionized the methods of inspecting dairy cattle for tuberculosis. With this agent it is possible to detect tubercular lesions which defy detection by auscultation, percussion, or other physical methods of diagnosis.

By the injection of 0.25 cc. of tuberculin a reaction will occur in every case where tuberculosis exists in the animal, and will not occur in an animal free from the disease.

In the examination of dairy cattle without the use of tuberculin it is impossible for the most expert inspector to guarantee the products of a dairy as being fit for human consumption. And those who pretend to weed out tuberculous animals from a herd without the use of this agent are merely imposing on the public and health authorities who employ them.

That tuberculin is a valuable aid in the diagnosis of tuberculosis is beyond question, but it should only be used in conjunction with the ordinary methods of examination, and it should only be used by those familiar with the disease.

PREVENTION.

In regard to the suppression and eradication of tuberculosis, we must bear in mind that the disease is not confined to one species of animal, but may be communicated to, and by, all animals. As long as there remains one tubercular individual, whether man or beast, there will be danger to all other animals.

By the use of tuberculin it is possible to isolate the diseased animals and make sure that those remaining are free from tuberculosis.

After the diseased animals have been removed the stable and surroundings should be thoroughly disinfected, and the herd should be submitted to tests with tuberculin at regular intervals.

Before permitting any dairy to put its produce on the market the tuberculin test should be applied, and a license be issued to each and every dairy, and any one marketing the produce of a dairy without a license should be prosecuted to the full extent of the law.

In case of butcher meats, until private slaughter-houses are abolished, it will be very difficult to conduct a system of meat inspection satisfactorily; but in time we hope to see each municipality owning and controlling its own abattoir, where all its meat supplies must be slaughtered and dressed. Then, by making a thorough examination before and after slaughtering, it will be possible to supply the public with an article of diet which is not only free from bacteria, but from all toxic elements produced by bacteria.

In order to accomplish all this, we must have suitable laws and ordinances, and these laws and ordinances should be enforced by competent inspectors. The time has passed when the public in this respect have been left to the tender mercies of a politician, whose appointment to the office of inspector was not due to his ability or knowledge, but because he had a "pull." The inspectors should be appointed by the government, whether it be for a city, county, or State, and it is the duty of the government to employ men who, through knowledge gained by hard study and experience, are familiar with and capable of recognizing this and all other diseases which are dangerous to human life. These men should be paid by the government, and not by the dairymen or owners of slaughter or packing-houses, as no inspector employed by these men can furnish a certificate of health which will be received with confidence by the public.

The members of our State Board of Health, who are here with us to-day, I venture to say, realize the necessity of a concerted action on our part to assist them in laying this matter before our legislators, and show them the necessity of providing laws and ordinances for the purification of our dairy herds, and of slaughter-houses, where all animal products destined for human consumption will be subjected to a rigid inspection by government inspectors.

I will now close, hoping that all those present to-day will leave here with the fixed intention to take the matter up, and endeavor by every means in their power to assist in getting legislation, armed with which our health authorities can place this great and glorious State in a position where she will be second to no other country in the world from a sanitary standpoint.

Gentlemen, I thank you for your kind attention.

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FOURTEENTH BIENNIAL REPORT
OF THE
STATE BOARD OF HEALTH
OF
CALIFORNIA,

FOR THE FISCAL YEARS FROM JUNE 30, 1894, TO JUNE 30, 1896.

ALSO,

THE TRANSACTIONS OF THE FOURTH ANNUAL SANITARY CONVENTION
HELD AT LOS ANGELES, APRIL 20, 1896.



SACRAMENTO:
A. J. JOHNSTON, : : : SUPERINTENDENT STATE PRINTING.
1896.

MEMBERS OF THE CALIFORNIA STATE BOARD OF HEALTH.

W. F. WIARD, M.D., <i>President</i>	Sacramento.
WINSLOW ANDERSON, M.D., <i>Vice-President</i>	San Francisco.
J. R. LAINE, M.D., <i>Secretary</i>	Sacramento.
J. H. DAVISSON, M.D.....	Los Angeles.
C. A. RUGGLES, M.D.....	Stockton.
P. C. REMONDINO, M.D.....	San Diego.
C. W. NUTTING, M.D.....	Etna Mills.

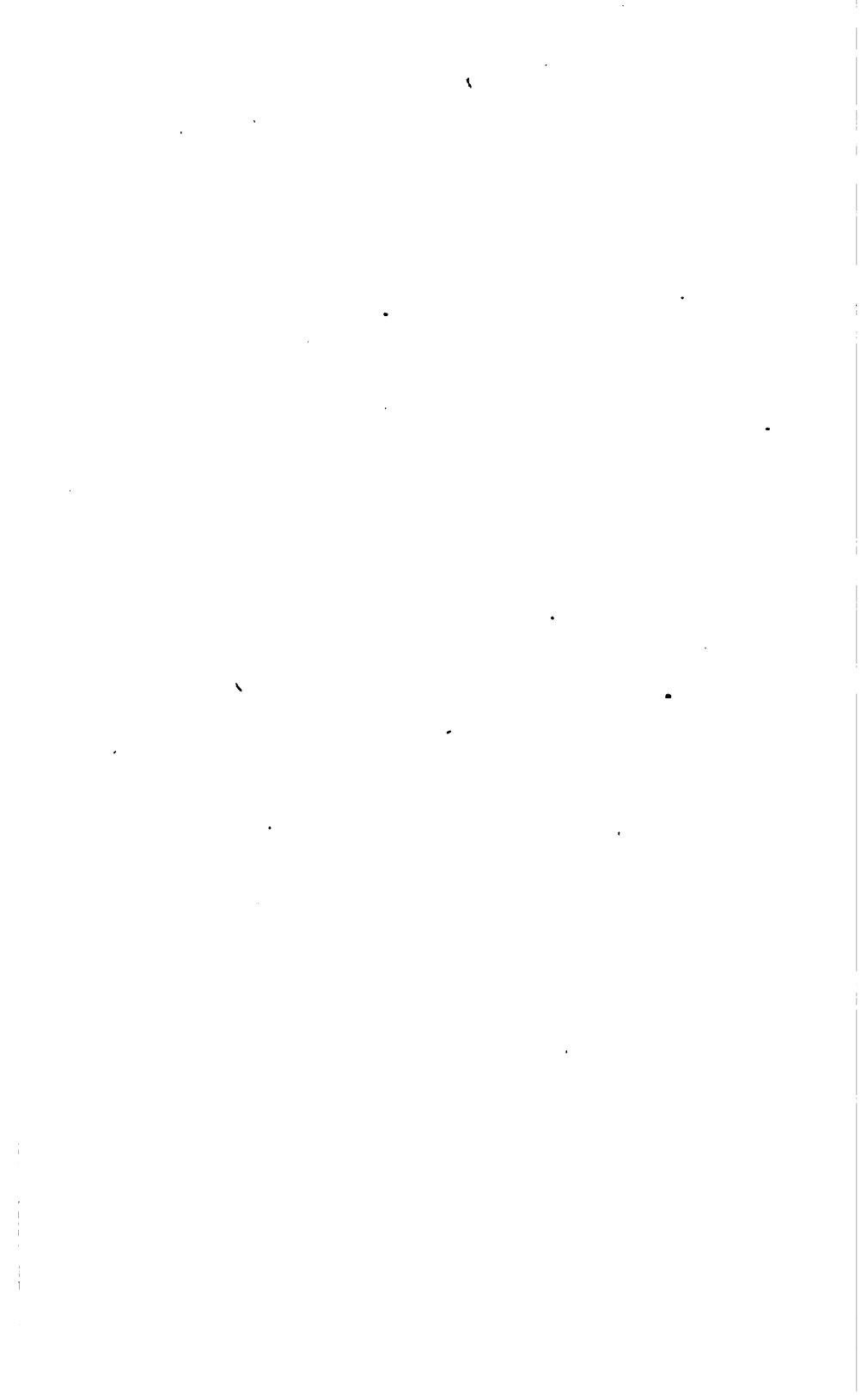
OFFICE CALIFORNIA STATE BOARD OF HEALTH, }
SACRAMENTO, August 15, 1896. }

To his Excellency JAMES H. BUDD, Governor of California:

SIR: I have the honor to present to you, in compliance with the laws of the State, the Fourteenth Biennial Report of the State Board of Health, for the fiscal year from June 30, 1894, to June 30, 1895, and from June 30, 1895, to June 30, 1896. Also, the proceedings of and papers read at the Fourth Annual Sanitary Convention, held April 20, 1896, at Los Angeles, Cal.

Very respectfully, your obedient servant,

J. R. LAINE,
Secretary State Board of Health.



GENERAL REPORT OF THE BOARD.

To his Excellency JAMES H. BUDD, Governor of California:

SIR: We have the honor to submit herewith the Fourteenth Biennial Report of the State Board of Health; also, the transactions of the Fourth Annual Sanitary Convention, held at Los Angeles, April 20th, 1896.

SANITARY INSPECTOR.

It became necessary, in the summer of 1895, to place a Sanitary Inspector on the desert near Yuma, Ariz., to protect the State against smallpox that raged on the territorial border adjoining Mexico.

PERMANENT QUARANTINE STATION.

It was deemed advisable to establish a permanent quarantine station agreeably to repeated recommendations of former Boards of Health. A quarter-section of land was purchased near Cabazon Station, on the Southern Pacific Railroad, 30 miles west of Indio. A spur track was constructed and a water pipe-line laid to the track. No buildings have been constructed, as it is deemed best to build sheds when necessary, and then to destroy them by fire. The cost of the land and the spur track and pipe-line, with purchase of water and care of track and line, for one year, is \$3,010.

DIPHTHERIA ANTITOXINE.

During the last session of the Legislature this Board asked for an appropriation of \$6,000 for the purchase and manufacture of diphtheria antitoxine for free distribution in the State.

This request met with your approval, and was urged in the House by Dr. James H. Glass, and in the Senate by Dr. A. J. Pedlar, and passed both houses and received your signature and became a law.

On behalf of many parents who have their children living and well, that without the beneficent effects of antitoxine would be dead, we desire to thank you and the honorable Legislature for the wisdom of their action. A report of the very moderate expense will be found in the financial report of the Secretary, while to those interested in such matters the marked decrease in mortality from diphtheria and croup since the quite general use of antitoxine will be shown by a comparison of the last two with former years.

MARITIME QUARANTINE.

During the prevalence of cholera in the Hawaiian Islands in 1895, we requested the General Government to assume control of all maritime quarantine matters on the Pacific Coast, so as to obtain uniformity of administration.

Maritime quarantine, to be effective, should imply authoritative supervision at ports of departure, of ships, cargo, food, water, passengers, and

where cargo and passengers come from; and their care while on the voyage, and their condition on arrival at port of destination. It must be seen that maritime quarantine is not a local matter, inasmuch as it involves principles of government the very opposite of local.

It must be understood that if extreme care be taken at foreign ports the danger of ships landing contagious diseases will be correspondingly lessened. No local Board of Health can exercise authority outside of its jurisdiction, while the General Government may exercise its powers by placing medical inspectors and consular agents at all infected ports, and may deny a landing to any vessel that refuses to submit to its rules and regulations at such ports of departure. The wisdom and justice of such action must be apparent, and no minor consideration should be permitted to intervene. Such general supervision need not and should not contemplate any infringement on the duties of local municipal authority. It should supplement it and extend beyond it.

PUBLIC INSTITUTIONS.

The minutes of the Board will show that a careful and rigid inspection has been made of the sanitary condition of the institutions of the State.

VITAL STATISTICS.

The following counties have reported, through their Clerks and Recorders, the deaths, births, and marriages reported to them: Alpine, Butte, Calaveras, Contra Costa, Del Norte, Fresno, Humboldt, Lake, Los Angeles, Madera, Mariposa, Modoc, Napa, Nevada, Orange, San Bernardino, San Diego, San Francisco, San Joaquin, Santa Barbara, Santa Clara, Shasta, Sierra, Sutter, and Yuba.

The counties which have not reported are Alameda, Amador, Colusa, El Dorado, Glenn, Inyo, Kern, Kings, Lassen, Marin, Mendocino, Merced, Mono, Monterey, Placer, Plumas, Riverside, Sacramento, San Benito, San Luis Obispo, San Mateo, Santa Cruz, Siskiyou, Solano, Sonoma, Stanislaus, Tehama, Trinity, Tulare, Tuolumne, Ventura, and Yolo.

Thus it will be seen that twenty-five counties have reported, while thirty-two have not.

The Recorders of the delinquent counties are liable to a fine of \$50, for each quarterly neglect, but this Board has no authority to convince the District Attorneys that they should proceed against them.

In view of the difficulty so far experienced in collecting vital statistics, we would recommend the creation, by the Legislature, of the office of "Registrar of Vital Statistics," to be appointed by the State Board of Health. He should keep a full and complete record of all births, deaths, and marriages in the State, placing all data under separate heads, and make up tables of such statistics for publication in the biennial reports. Such records will be very valuable in the future.

The salary should be \$1,800 per annum.

MARRIAGES AND BIRTHS.

No tables of marriages and births are attempted in this report, inasmuch as they would be fragmentary and incomplete, and, moreover, misleading.

This will not apply to the mortality report, for, while reports from less than one half of the counties in the State have been received, these counties have the bulk of the population of the State.

Alameda and Sacramento Counties have not reported, yet the reprinted monthly reports show data from the Oakland, Alameda, Berkeley, Haywards, Pleasanton, Livermore, Sacramento City, and Folsom health offices. These reports will continue to be incomplete and inaccurate until the Legislature, acting upon the recommendations of the Code Commission, makes provisions for the enforcement of the law relating to vital statistics and creates the office of Registrar, under the direction of the State Board of Health.

FOLSOM PRISON.

This prison violates the law by discharging its sewage into the American River. There is sufficient water-power going to waste that might be utilized to pump this sewage on to the prison farm, where it could be used as irrigation and fertilizer. It should be done at once. No State institution, and more especially one maintained for the repression of crime, should be permitted to set an example of lawlessness by an open violation of the law relating to pollution of rivers and streams.

TUBERCULOSIS AMONG MILCH COWS.

This Board has urged that municipalities issue licenses to sellers of milk, but that they refuse licenses to sellers of milk who bring milk from dairies that do not conform to the standard of requirements established by the local Boards of Health.

These requirements should include clean food, pure water, sanitary surroundings, and good health among the cattle. They should include the application of the tuberculin test for consumption. They should exclude from sale and consumption all milk from dairies that keep tuberculous cows. If the owners choose to kill such cows, so much the better, and the loss should fall on the owners, as the loss that falls on the owners of hogs that die of cholera. If the State undertakes to pay for all sick animals, it should include all kinds, and not tuberculous cattle only.

The Pure Food Law passed by the last Legislature covers the sale of milk of diseased cows, as well as the sale of the flesh of diseased animals. The simple enforcement of that law would do away with the dairy products of consumptive cows, and also their carcasses.

We have the honor to be,

Very respectfully, your obedient servants,

W. F. WIARD, M.D.,

President,

WINSLOW ANDERSON, M.D.,

Vice-President,

J. R. LAINE, M.D.,

Secretary,

J. H. DAVISSON, M.D.,

P. C. REMONDINO, M.D.,

C. A. RUGGLES, M.D.,

C. W. NUTTING, M.D.,

State Board of Health.

ABSTRACT OF PROCEEDINGS OF THE BOARD,

AS SHOWN BY THE MINUTES.

JULY 9, 1894.

The State Board of Health met, pursuant to call of the President, to attend a regular quarterly meeting. Present: Drs. Wiard and Laine.

There being no quorum, owing to the inability of members from a distance to be present, on account of a general strike on all the railroads, the Board adjourned, to meet at San Francisco on a date to be fixed by the President.

JULY 26, 1894.

Regular meeting of the State Board of Health, called by the President to meet in San Francisco. Present: Drs. C. A. Ruggles, Winslow Anderson, W. F. Wiard, and J. R. Laine.

The reading of the minutes of the previous meeting was dispensed with.

On motion of Dr. Anderson, Dr. Wiard was elected to represent the Board as delegate to the American Public Health Association, at Montreal, in September, with Dr. C. A. Ruggles as alternate.

The Secretary was instructed to prepare a circular on the care of consumptives, to be submitted to the Board, before publication, at the next regular meeting.

Dr. Anderson reported having caused a bacteriological examination of suspected tuberculous meat, for the President and by his order, to whom a report has been made. The bill for the examination was \$25, which was ordered paid.

Dr. C. A. Ruggles stated to the Board that he had now been its President for more than two years, and while the duties were not arduous, yet he believed that the honor of the position should be passed along to other members. He therefore resigned, and with graceful words thanked the members for their uniform courtesy and forbearance with his rulings.

Dr. Anderson, in fitting terms, paid just tribute to the labors of the retiring President, and moved that as it was his wish to resign, his resignation be accepted. In doing so, he moved that, on behalf of the people of the State of California, the Board give Dr. Ruggles a vote of thanks for his faithful and efficient labors rendered the State as a member and President of the State Board of Health. This was unanimously adopted.

Dr. Anderson then placed Dr. C. W. Nutting in nomination for President for the ensuing year, and he was unanimously elected.

On motion of Dr. Wiard, Dr. Winslow Anderson was nominated for Vice-President for the ensuing year, and he was unanimously elected.

The Secretary was authorized to obtain such assistance as he may require to complete his biennial report and the circular on care of consumptives. The Board then adjourned.

OCTOBER 15, 1894.

Regular quarterly meeting of the State Board of Health, held at the office of the Secretary, Monday evening, October 15, 1894, at 8 o'clock P. M. Present: Drs. C. A. Ruggles, W. F. Wiard, Winslow Anderson, and J. R. Laine.

Letters were read, which had been received by the Secretary from Dr. C. W. Nutting and Dr. J. H. Davisson, giving reasons for non-attendance.

Drs. Ruggles and Laine were appointed a committee to go to San Francisco on November 15th to arrange for the Third Annual Sanitary Convention, to be held in April, 1895. Such steps were deemed necessary, in order to give sufficient time for the preparation of papers for the occasion.

It was deemed advisable to delay the publication of the circular on the Restriction and Prevention of Consumption, until after the meeting of the Tenth Annual National Conference of State Boards of Health, at Washington, D. C., December 12, 1894, in order to ascertain their views and action.

In view of the very important questions to be discussed at such National Conference, looking to future national legislation relating to quarantine by the National Government, and other equally important matters, it was believed that delegates from California should be sent to take an active part in the proceedings. On motion of Dr. W. F. Wiard, Drs. C. A. Ruggles and J. R. Laine were chosen to represent the California State Board of Health at the National Conference of the State Boards of Health, at Washington, D. C., December 12, 13, 14 and 15, 1894.

The publication of the thirteenth biennial report of the State Board of Health, by the Secretary, was approved.

The Board decided to pay the expenses of the two delegates to said National Conference, out of the Contagious Disease Fund.

JANUARY 28, 1895.

Regular meeting of the State Board of Health, held at the office of the Secretary. Present: Drs. C. W. Nutting, J. H. Davisson, C. A. Ruggles, W. F. Wiard, and J. R. Laine.

Minutes of the previous meeting were read and approved.

A communication from Dr. P. C. Remondino was read and ordered placed on file.

The report of Drs. Laine and Ruggles, delegates to the Tenth Annual National Conference of State Boards of Health, was read and ordered placed on file.

Dr. Davisson, speaking on the subject of the State manufacturing antitoxine, took the ground that the Biological Department of the State University should, under the auspices of the State Board of Health, have control of the matter.

Drs. Wiard and Ruggles expressed similar views.

Dr. J. H. Glass, Chairman of the Assembly Committee on Hospitals, etc., was invited in.

Dr. Davisson moved that the Board ask for an appropriation of \$6,000 with which to proceed with and aid in the establishment of a Bacteriological Department in the State University, where the State Analyst

can go on and manufacture antitoxine and distribute it under the direction of the State Board of Health.

Dr. Glass believed that the Legislature would cheerfully grant the requisite amount to carry out the measure deemed necessary by the State Board of Health.

Dr. Ruggles moved to delay action on the motion until 10 o'clock A. M., January 29th.

Dr. Wiard moved that a State Sanitary Convention be held at the usual time, and the Secretary was authorized to give the regular notice.

Adjourned until 10 A. M., January 29th.

JANUARY 29, 1895.

Board met pursuant to adjournment.

The motion to ask the Legislature for an appropriation of \$6,000, made at the previous meeting, was adopted.

A bill was formulated and adopted, and a committee, consisting of Drs. Ruggles, Wiard, and Laine, was appointed to appear before the legislative committee in the interests of the bill. The committee was instructed to prepare a memorial to present with the bill.

Drs. Laine, Ruggles, and Anderson were appointed a committee to make arrangements for the Third Annual Sanitary Convention, and to secure a hall and employ a stenographer. The Secretary was authorized to employ a clerk to assist in the preparation of material for the Sanitary Convention.

On motion of Dr. Laine, the Board decided to purchase one hundred and sixty acres of land near Cabazon Station, for a permanent quarantine refuge station.

Dr. Anderson moved the segregation of patients suffering from incurable consumption. After discussion, the matter was deferred until the next meeting, as in the meantime a Sanitary Convention would be held, on which occasion the question would probably be more fully discussed.

APRIL 13, 1895.

Regular quarterly meeting of the State Board of Health. Present: Drs. Ruggles, Wiard, and Laine.

Letters were received from Drs. Davisson and Nutting, stating that they would meet with the Board, if it would adjourn to San Francisco on Monday.

There being no quorum present, the Board adjourned, to meet at the Academy of Sciences, the following Monday, April 15th, at 1:30 P. M.

APRIL 15, 1895.

Regular adjourned meeting of the State Board of Health, at San Francisco.

The Board met with the State Sanitary Convention at the Academy of Sciences in San Francisco, attending forenoon and evening sessions. Present: Drs. Nutting, Anderson, Ruggles, Wiard, Davisson, and Laine.

The proceedings of the convention were ordered printed, and the Sanitary Convention adjourned for one year.

The Board adjourned until 9 A. M. April 16th, at the room of President Nutting, at the Baldwin Hotel.

APRIL 16, 1895.

Regular adjourned meeting of the State Board of Health, at San Francisco. Present: Drs. Nutting, Anderson, Wiard, Ruggles, Davisson, and Laine.

Minutes of the previous meeting were read and approved.

The Secretary was instructed to audit bills for the holding of the Sanitary Convention, to approve same, and cause them to be paid out of the fund for the "Prevention of the introduction of contagious diseases into the State."

The claim of Modoc County, for \$2,363 48, expended in stamping out a recent epidemic of smallpox, was presented to the Board, with the opinion obtained after its submission to the Attorney-General. The Attorney-General had rendered the opinion that the expenditure was without the authorization of the State Board of Health, and not by their direction, and there was no liability on the part of the State. The entire opinion of the Attorney-General is as follows:

ATTORNEY-GENERAL'S OFFICE, STATE OF CALIFORNIA, }
SACRAMENTO, April 12, 1895. }

J. R. LAINE, M.D., *Secretary of State Board of Health, Sacramento, Cal. :*

DEAR SIR: Replying to the first inquiry of your communication of April 11, 1895, I am instructed by the Attorney-General to say that the account of Modoc County, if, as stated by your communication, was without authorization of the State Board of Health, and not by their direction, there is no liability on the part of the State.

Subdivision 22 of Section 25 of the Act to establish a County Government (Laws of 1893, page 356), makes provision for the protection of the health of the people of the county in such cases as suggested by the heading of the account, and directs that all necessary expenses for enforcing this Act shall be paid out of the General Fund of the county.

In answer to your second question as to the purchase of a tract of land for a permanent quarantine station: If, by a resolution of your Board, at a regular meeting, the necessity for such a station is determined upon, I am of the opinion that it may be purchased from the balance remaining from the appropriation made by the Act of 1893 for the prevention of the introduction of contagious diseases; but it must be done under the direction of the Governor, and the resolution should recite the necessity therefor, for the prevention of the introduction of contagious and infectious diseases into the State.

The question of conducting water, and the means incidental thereto, are an apparent necessity, if the site be purchased, and may be included in a resolution as above.

I doubt your authority to make a contract with the Southern Pacific Railroad Company for the construction of a spur, and must decline to give an opinion, unless the elements of a contract with such company be submitted. If a contract can be made so as to give your Board absolute control of the spur, I think it may be done. I would, however, wish to know the terms before expressing definite opinion.

Respectfully,

J. C. DALY,
Assistant Attorney-General.

The matter of purchasing a quarter-section of land adjacent to Cabazon Station was next taken up, and the correspondence had with the Southern Pacific Company duly submitted.

Dr. Anderson introduced the following resolution, which was passed unanimously:

WHEREAS, The State Board of Health has found it necessary, from time to time, whenever reports of approaching contagious diseases from Mexico, or any point east or south, were received, to send an inspector to some point near the State line to prevent such contagious disease from entering the State, and has found it necessary to detain trains on the inhospitable desert; and

WHEREAS, The establishment of a permanent quarantine or refuge station, at some point between Yuma and the more thickly settled portions of Southern California, is believed to be necessary, in order to avoid danger; therefore,

Resolved, That the State Board of Health purchase for the State one hundred and sixty acres of land adjacent to Cabazon Station, on the Southern Pacific Railroad, on

the western borders of the Salton Desert, which, after a thorough survey of the field, is believed to be the only practicable point between the Colorado River and Los Angeles;

Resolved, That they cause the roadbed to be graded, and a spur to be built thereon leading to the most convenient point on the tract of land to be purchased; that they cause a water-pipe to be extended from the Southern Pacific Railroad station tank at Cabazon to the land in question, for the purposes: first, of supplying the detained passengers and trains, in case it should be found necessary to do so; second, to irrigate a plat of ground around the refuge station and supply moisture for trees that will be set out, in order to afford shade to those who may be unfortunate enough to be detained;

Resolved, That, if found necessary, at least \$100 a year should be expended to care for the trees and grass plat at the station; that it is not believed to be necessary to erect permanent buildings upon the quarantine grounds, inasmuch as temporary structures can be erected with lumber obtained from Los Angeles at extremely short notice; that if anything of a permanent character should be attempted, it should be simply the erection of sheds over the proposed spur at the quarantine station, so that a train, or cars, if detained, would be under shelter of sheds to protect them from the rays of the hot sun; but that it is not deemed expedient to do this at the present time.

Dr. Davisson offered the following resolution, which was adopted:

Resolved, That the State Board of Health proceed to purchase for the State, at the price of \$400, the following described tract of land near Cabazon Station, on the Southern Pacific Railroad: The S.E. $\frac{1}{4}$ of section 9, township 3 south, range 2 east, S. B. M., to be used as a permanent quarantine and refuge station against the introduction of contagious and infectious diseases into the State of California; and that the committee appointed by the State Board of Health are hereby authorized, empowered, and instructed to confer with the Governor of the State of California, with a view to the completion of the purchase and the construction of a pipe-line from the Southern Pacific water-pipe, and also the construction of a necessary spur from the Southern Pacific Railroad to the refuge station; also, the setting-out of trees and grass plat, and making the necessary arrangements for their care and irrigation; also, to arrange for the erection of necessary sheds, buildings, and other improvements when found necessary.

Dr. Davisson then moved that the Chair appoint a committee of three to have this matter in charge, and that Dr. Laine be made Chairman of the committee, and that said committee be empowered to contract for the expenditure of such sums as may be found necessary to carry these instructions into effect.

The motion was carried, and the Chair appointed Drs. Laine, Ruggles, and Davisson.

Dr. Anderson offered the following resolution with reference to the purchase of antitoxine:

Resolved, That the Secretary be instructed to purchase \$125 worth of Roux antitoxine, and \$125 worth of Behring's antitoxine, for free distribution under direction of the State Board of Health.

Adopted.

Dr. Ruggles moved that the State be divided into five districts, each to be presided over by a member of the State Board of Health, for the purpose of receiving and distributing the diphtheria antitoxine; that District No. 1, to be presided over by Dr. Nutting, comprise the territory from the Oregon line to Redding; District No. 2, to be presided over by Drs. Laine and Wiard, comprise the territory from Redding to Sacramento, inclusive; District No. 3, to be presided over by Dr. Ruggles, consist of Stockton, the San Joaquin Valley, and the territory south to Tehachapi; District No. 4, to be presided over by Drs. Davisson and Remondino, comprise the territory from Tehachapi Pass south to the State line; District No. 5, to be presided over by Dr. Winslow Anderson, comprise San Francisco and surroundings.

The motion was carried.

On motion of Dr. Anderson, the Secretary was instructed to prepare

return blanks to accompany each package of antitoxine distributed; such blanks to contain the following data: The date of the manufacture of the antitoxine; the name of the physician who injected it; the date of the injection, and the name of the person on whom it was injected; the card to be signed by the physician who uses it, and returned at once to the distributing officer.

The President appointed Drs. Laine, Anderson, and Ruggles as a committee of three, to confer with the members of the Veterinary Department of the State University, as to the immediate manufacture of antitoxine for the State Board of Health.

The Secretary was authorized to appoint a stenographer and typewriter to assist in carrying out the instructions of the Board.

The Secretary was also instructed to prepare a circular, embodying the views of the Sanitary Convention as to the establishment of hospital rooms in hotels, lodging-houses, and private residences, and to see to the distribution of same; another on diphtheria, with antitoxine treatment; another on smallpox, typhoid fever, measles, whooping-cough, consumption, contagious diseases of the eyes; and another on the practical tests of pure drinking water; and to cause the same to be printed and distributed.

Secretary Laine was instructed to go to Pleasanton, at his convenience, at the invitation of Dr. Cope, to confer with the authorities with reference to perfecting a system of sewerage at that place.

On motion of Dr. Ruggles, the Board proceeded to the election of officers for the ensuing year.

On motion of Dr. Ruggles, Dr. J. H. Davisson of Los Angeles was unanimously elected President for the ensuing year. On motion of Dr. Wiard, Dr. Winslow Anderson was unanimously elected Vice-President for the ensuing year, and Dr. Laine was elected Secretary.

On motion of Dr. Wiard, Dr. J. H. Davisson was elected delegate to the Section of Public Health at the American Medical Association, meeting to be held in Baltimore, May 8, 1895. His expenses to be paid out of the fund for the prevention of the introduction of contagious diseases into the State.

The Board then adjourned, to meet and inspect the Home for Adult Blind in Oakland, and the Asylum for Deaf and Dumb and the Blind at Berkeley.

APRIL 18, 1895.

The Board proceeded to the Home for Adult Blind at Oakland, and made a sanitary survey of the institution, and an inspection was made of the kitchen, stores, dining-room, dormitories, and laboratories, also of the grounds. Everything about the institution was pronounced to be in good sanitary condition. No objection could be made to the condition of the kitchen and storehouse. The only recommendations made to the Superintendent were, that the dining-room should be calcimined and that screens should be obtained at once for the kitchen and dining-room. This, the Board was informed by the Superintendent, had already been ordered. In view of the fact that the management was under the authority of a blind man, the general condition of affairs was most satisfactory.

The Board then proceeded to the Asylum for the Deaf and Dumb and the Blind, situated at Berkeley, more with a view of seeing the pleasing

surroundings of the locality, than with the expectation of discovering any sanitary deficiencies. They found occasion merely to commend what they saw, and returned to San Francisco.

The committee appointed to confer with a committee from the Veterinary Department of the State University, met them at the office of Dr. Winslow Anderson, where the figures produced by the veterinary committee showed that, in order to manufacture antitoxine, an estimated expenditure of between \$5,000 and \$6,000 would be necessary during the two years for which an appropriation by the Legislature had been made. This would not include an estimate for the services of the University faculty. In consideration of these figures, the committee decided to report that they deemed it inexpedient to manufacture the remedy; therefore, on motion of Dr. Anderson, the Secretary was instructed to purchase antitoxine to the amount of \$250, at as low a figure as it could be obtained, to be distributed free, under the direction of the State Board of Health. The Board was informed that private firms have undertaken the manufacture of the remedy, and in consequence there was every probability that in the course of a few months it could be obtained at a reasonable figure.

The Board then adjourned.

JUNE 5, 1895. .

A special meeting of the State Board of Health was held at Los Angeles, at the office of Dr. J. H. Davisson, on June 5, 1895. Present: Drs. Davisson, Remondino, Wiard, Ruggles, Anderson, and Laine.

The President stated that the object of the meeting was to consider the epidemic of smallpox in Arizona, which had necessitated the sending out of an inspector on trains between that Territory and California. Dr. M. F. Price was the inspector.

The President read a statement from the inspector concerning present condition of affairs at points in the smallpox region.

On motion of Dr. Wiard, the appointment of Dr. Price was confirmed.

On motion of Dr. Remondino, the salary of the inspector was fixed at \$250 per month and actual expenses.

Dr. Ruggles reported having visited the Preston School of Industry, at Ione, agreeable to request by wire from Governor Budd, and having found a convalescent case of scarlatina, two convalescent cases of typhoid fever, and two cases of la grippe. The report was accepted, and the bill of Dr. Ruggles for the trip to Ione was determined to be outside of his official duty as a member of the Board, and was ordered paid out of the Contagious Disease Fund. The bill was for \$25, and no traveling expenses.

The Secretary reported having, by inadvertence, appointed Dr. George Goodfellow inspector for the Board in Arizona; but that as the Secretary had received no reports from him agreeable to his instructions, he could not say if any services had been performed. The Secretary was instructed to write to Dr. Goodfellow and ascertain if he had performed any services by the authority given him by the Secretary in his appointment.

The Secretary was instructed to purchase a new supply of antitoxine, and to secure a new supply every month. He was also directed to order new piston syringes for use with antitoxine.

On motion of Dr. Wiard, the Board agreed unanimously to meet at 2 p. m. the next day at Santa Catalina Island, to pass upon and examine into the claims made for that island as a natural sanitarium.

JUNE 6, 1895.

Adjourned special meeting of the State Board of Health, at Santa Catalina Island. All members present, excepting Dr. C. W. Nutting.

The island was reached by steamer from San Pedro Harbor. The day was clear and the sea calm. Flying-fishes sprang from the waves and, describing a glittering and crescentic flight, dropped again into the water. Great fishes projected their vicious dorsal fins above the waves, and when disturbed by the steamer's approach, their brown bodies became lost in the depths. A school of whales estimated at twenty or more was encountered; some spouted, while others seemed to be disporting themselves, idly raising their great balloon-like bulks above the surface of the sea, to astonish us by their immensity, and then sink indolently back into the green water in apparent comfort.

The steamer landed in a beautiful, crescent-shaped indentation on the southeast side of the island. This is Avalon. Landing was made at a projecting wharf, amidst a flotilla of small boats at their moorings.

The island is a mountain rising in the ocean, from one to eight miles wide and about twenty-five miles long. Its rocky and wave-washed abutments on the west lift the wind and fog, when they prevail, above the crest of the serrated range, so that the little harbor of Avalon is protected and sheltered from them. The temperature varies from 1° to 6° Fahr., between day and night the year round. There is little or no tide. The morning air is still and warm. A feeling of rest is engendered as you gaze at sea and mountain, and the senses are lulled into a condition that induces refreshing sleep. The appetite which follows is a surprise.

The management is making improvements commensurate to the requirements of guests. Avalon is already in appearance a thriving village. The hotel accommodations are ample. There is a sand and gravel beach and a bath-house close by. The fishing is unsurpassed. Santa Catalina has a leading place in the list of Southern California attractions, and stands at the front as a marine sanitarium in any country on the globe. The restorative quality of air and scenery is attested on indisputable authority. The experience is novel even to old travelers, and its recollection is pleasing beyond the commonplace. A trip to this island is a sanitary experience which will be neither regretted nor forgotten.

The Board adjourned until next day.

JUNE 7, 1895.

Adjourned special meeting. All present, except Dr. C. W. Nutting.

An inspection of the State Normal School at Los Angeles was made. There was nothing to be noted in the old part of the building, as that part had been inspected before; but a new part has been added, which is commodious, well lighted, and well heated; no provision, however, has been made for ventilation, except by the windows and doors. The hat and cloak rooms are dark and narrow, and open directly into the water-closets. The closets and urinals are of modern pattern, but there is no adequate ventilation of the closets. A closet 8 x 20 feet, with several seats and three or four urinals, needs something more than a

12-inch or 14-inch grated opening set in the wall several feet from the ceiling, as a ventilator. The construction of this part of the building, with reference to its ventilation, is abominable, and was unanimously condemned. A ventilation shaft of large dimensions should pierce the building from base to dome, so as to freely ventilate the closets and free the cloak rooms from odor. Adequate ventilation for the class and other rooms cannot be put in now without defacement of the walls and increased expense.

The Board adjourned, to meet next day at Highland Insane Asylum.

JUNE 8, 1895.

Adjourned special meeting at Highland Insane Asylum. All present, except Dr. C. W. Nutting.

The building, consisting of two wings, with necessary culinary and laundry appurtenances, is situated on an elevated slope, overlooking a wide and fertile valley. No administration building has yet been erected. The wards, dormitories, lavatories, corridors, kitchens, dining-rooms, sculleries, and grounds were scrupulously clean and neat. The food-supplies were of good quality. The water-supply is ample, but carries a large quantity of sediment in winter. It is carried thirty miles in an open ditch, which skirts the mountains north of the asylum, and is received in a reservoir at the base of the range, a short distance above the grounds. A new supply, for drinking purposes, should be obtained; this can be done, at small expense, from deep wells. This would, in addition to the advantage of clear water, obviate the danger of contamination in the open ditch. There should be lateral sewers constructed from the main sewer, so as to increase the acreage of land irrigated by the sewage from the asylum. Otherwise, the plumbing, sewerage, and drainage of the asylum are sufficient for present purposes.

Adjourned to meet, unofficially, at Mount Lowe, or Echo Mountain, the next day.

JUNE 9, 1895.

The Board visited Mount Lowe, or Echo Mountain, unofficially. It is situated on one of the steps of the great range that forms the northern boundary of the lowlands that face and descend to the ocean. The chief interest is in reaching an altitude of 3,500 feet in a very short time, and in a peculiar manner. This is done by trolley as far as possible, but the trip is concluded in a car attached to an endless cable that makes a lift of 1,300 feet over a track about 3,000 feet in length. A portion of this track has a grade of 65 feet to the 100. The ascent and descent are thrilling enough for the most daring. Experience and observation show that the air on Echo Mountain is warmer in winter and cooler in summer than it is down in the valley. For a view over a wide and varied range the scene is unrivaled: the rugged mountains, rent, seamed, and scarred on side and rear; an expansive valley spread out at our feet; the ranches and orchards set out in checker-board precision: first, Pasadena is seen amidst green orchards, but beyond and across a low range of hills Los Angeles is seen, smokily blending with the ocean twenty miles farther, terminating its cloudy green tints in the towering cliffs of Santa Catalina Island. The change from the valley to Echo Mountain is agreeable to asthmatic trouble, and proves a tonic to those suffering from any form of nervous, mental, or physical depression.

The well-appointed hotel, spacious and in every way luxuriously equipped, would indicate that the patronage is chiefly from the leisure class. The choice is well made; the project is daring in conception and execution. A large observatory adds to the attraction. This resort will, without doubt, lengthen the days of many weary men. A brain-fagged man reaches this spot, which in no manner resembles a health resort, and is charmed and lulled into rest; and is thus forced by interest and admiration to remain longer than he had planned. His dull eyes light up with renewed life; the yellow mists of melancholy lift from his brain; the cumulative evils of overwork are neutralized by the life-giving surroundings, and he recuperates, until he returns to the rack—for a time, at least, renewed.

JUNE 10, 1895.

Adjourned special meeting at Whittier State School. All present, except Dr. C. W. Nutting.

Sanitary inspections of this school have been made before, and nothing but words of commendation have been spoken. The Board found nothing to criticize adversely. The new work and buildings show knowledge of the value of light and ventilation. The old building is clean, and the health of pupils excellent.

The Board would suggest the advisability of regularly enlisting two or three full companies of the older boys into the National Guard, with a view, first, of furnishing a motive for ambition, by good behavior, to become eligible to enlistment; second, to have two or three companies of State troops always on duty at the school, uninfluenced by local consideration, except to obey their officers. Arms and uniforms might be furnished with safety. Quarters, food, clothing, and military instruction in evolutionary tactics are now supplied. Arms of old pattern, with instruction in manual and guard mount, would convert the boys into a very effective State force, which might be depended on, so far as sentimental considerations are concerned, at times, even better than an equal number of the National Guard.

Adjourned.

JULY 22, 1895.

Regular quarterly meeting of State Board of Health. Present: Drs. Davisson, Wiard, Ruggles, Anderson, and Laine.

Dr. Davisson reported the continuance of the epidemic of smallpox in Arizona Territory, near the Mexican border, and expressed the opinion that it would be advisable to continue the inspection of trains on the desert. He also reported that Dr. M. F. Price, the inspector for the Board, was now located at Indio, in Salton Desert.

On motion of Dr. Wiard, the matter of inspection against smallpox in the south was left to the discretion of the President of the Board, Dr. Davisson.

Dr. Laine was elected delegate to the American Public Health Association, at Denver, Colorado, to meet October 1st to 4th; and Dr. Ruggles, to the National Conference of State Boards of Health; the expenses of each to be paid out of the appropriation to prevent the entrance of contagious diseases into the State.

The Board adjourned, to meet the next day at Agnews Asylum.

JULY 23, 1895.

Adjourned regular meeting of State Board of Health, at Agnews Insane Asylum. Present: Drs. Davisson, Ruggles, Wiard, Anderson, and Laine.

A careful sanitary inspection of the asylum was made—its grounds, wards, dining-rooms, kitchens, store-rooms, laundry, bakery, plumbing, baths, lavatories, closets, urinals, and other necessities—and proved them to be in good sanitary condition. The water-supply is unexceptional, and the quantity inexhaustible. It is obtained from flowing wells on the grounds. The sewage is carried a long distance, and the system is free from objection. There is evidence of careful and humane treatment of inmates, and everything about the asylum is in a satisfactory condition.

The Board adjourned, to meet at San Quentin Prison the following day.

JULY 24, 1895.

Adjourned regular meeting of State Board of Health, at San Quentin Prison. Present: Drs. Davisson, Ruggles, Wiard, Anderson, and Laine.

The Board, after examining into the sanitary condition of the various quarters for prisoners, inspected the dining-rooms, kitchens, and store-rooms. The jute mills were also examined. Nothing in the way of improvements can be done to quarters for prisoners. The cells now in use are as healthy as such places of like dimensions can be made. There is nothing in the occupation of the prisoners, in any department, which in any way lowers the general health. The large number of sufferers from pulmonary disease (consumption) is an inseparable accompaniment of a conglomeration of prisoners from the various jails of the State. The prison management is able to show that these cases come to the prison already afflicted with consumption. The best reasons exist leading to such a conclusion. The kitchen at this prison is a nuisance and a disgrace to a State institution. It is much improved over its condition when this Board first inspected it, but it can never be made satisfactory. The entire building used as a kitchen and dining-room should be torn down and removed altogether, the ground terraced down to an agreeable slope, and the adjoining building on the west side should be occupied on its ground floor as a dining-room, kitchen, store-room, and bakery, and the upper floor as hospital rooms and for other purposes. At present, the buildings stand so close together as to interfere with the light; it is necessary to burn gas in the kitchen and bakery every day. The old structure has outlived its usefulness, and should be removed.

The Board adjourned.

SEPTEMBER 3, 1895.

Special meeting of the State Board of Health, held at 920 Sutter Street, San Francisco. Present: Drs. Winslow Anderson, C. A. Ruggles, W. F. Wiard, and J. R. Laine.

Dr. Anderson, presiding, stated the object of the meeting to be to determine whether any information regarding the prevalence of cholera at Honolulu or Asiatic ports should be sent to the General Government.

Dr. Laine introduced the following resolution:

Resolved, That the Secretary be directed to communicate to Surgeon-General Walter H. Wyman, of the U. S. Marine Hospital Service, the general reports concerning the presence of cholera in Oriental and Island ports having steam communication with United States Pacific ports, asking that, if our information is corroborated by United States Consular advices, the Government declare such Oriental and Island ports infected, and that it proceed to establish such quarantine against them as shall insure compliance with the quarantine laws, rules, and regulations of the United States.

The resolution was adopted. Dr. Ruggles did not vote. He stated that he would be willing to vote to declare certain ports infected, but would like to vote against asking the Government to declare a quarantine against them, or for asking the Government to enforce the United States quarantine laws, rules, and regulations against them.

The Secretary prepared the following letter, which was unanimously ordered wired to Washington:

To WALTER H. WYMAN, Surgeon-General U. S. A., M.D., *Washington, D. C.*:

SIR: I am directed by the California State Board of Health to communicate to you that it is currently reported that Asiatic cholera prevails in several Oriental ports having steam communication with United States Pacific ports; and that it prevails also at Honolulu, in the Hawaiian Islands, a foothold having been recently obtained in that port through passenger travel by steamer from China and Japan. Should this general and unofficial information be corroborated by Consular reports, it is deemed advisable that the Government should declare such Oriental and Island ports infected, and proceed to establish such quarantine against them as shall insure compliance with the quarantine laws, rules, and regulations of the United States.

J. R. LAINE, M.D.,
Secretary.

The Board then adjourned.

SEPTEMBER 16, 1895.

Special meeting of the State Board of Health, held at San Francisco. Present: Drs. Davisson, Wiard, Anderson, Ruggles, and Laine.

The President, Dr. Davisson, stated the object of the meeting to be to advise with reference to cholera, and to meet the San Francisco Board of Health, on their invitation.

Dr. Ruggles introduced the following preamble and resolution, which was unanimously adopted:

WHEREAS, The California State Board of Health, at a special meeting held on September 3d, requested the General Government, through the Marine Hospital Service, to declare certain Oriental and Island ports infected with cholera, and that such quarantine be declared against them as should insure compliance with the quarantine laws, rules, and regulations of the United States; and

WHEREAS, Surgeon-General Wyman, on September 4th, replied, stating that the presence of cholera in Oriental ports and Honolulu was confirmed by Consular advices, and that all quarantine stations on the Pacific Coast were in a high state of efficiency, and that steps would be taken to prevent the entrance of cholera into the United States; therefore be it

Resolved, That the California State Board of Health, acting in its advisory capacity, would recommend that the local health authorities at every port along the coast declare a quarantine against such foreign ports as have been officially declared by the General Government to be infected, and to appoint inspectors to examine every vessel and sailing craft of every description that may attempt a landing at the smaller ports; and further

Resolved, That all Boards of Health in the State be strongly advised to urge the cleansing of all towns and villages, the putting of all sewers in a sanitary condition, the cleansing of privies, and the annihilation of all odors from decomposing substances; that closets and privies at railroad stations and ferries, and at points where people congregate in considerable numbers, be newly cleansed and flushed; and that the people be instructed to boil the water for drinking purposes, and to eat nothing but recently cooked food.

In view of the continued prevalence of smallpox on the Mexican border, the necessity of vaccination is apparent, and, on motion of Dr. Davisson, the State Board urged vaccination as the essential precaution against infection.

The Secretary was instructed to purchase a supply of antitoxine.

The meeting adjourned, to meet at the Mayor's office, in the City Hall, at 10 o'clock the next day.

SEPTEMBER 17, 1895.

Adjourned special meeting of the State Board of Health, held at the office of the Mayor of San Francisco, in the City Hall, in conference with the City Board of Health of San Francisco, and Dr. Godfrey of the United States Marine Hospital Service. Present: Drs. Davisson, Wiard, Anderson, and Laine, of the State Board of Health; Mayor Adolph Sutro, and Drs. Morse, Williams, Hart, and Fitzgibbon, of the San Francisco Board of Health; Dr. Mayon, of the Health office of Oakland.

Remarks were made by Mayor Sutro, Dr. Davisson, Dr. Hart, and Dr. Godfrey.

A committee was appointed to draught resolutions in relation to the prevention of the entrance of the Asiatic plague into our country. Drs. Morse, Anderson, and Godfrey were placed on the committee.

The conference then adjourned.

OCTOBER 14, 1895.

Regular quarterly meeting of the State Board of Health. Present: Drs. Anderson, Ruggles, Nutting, Wiard, and Laine.

Minutes of previous meetings were read and approved.

A communication from the Attorney-General was read, and blank contract was received for spur and water pipe-line at Cabazon, a station on the Southern Pacific Railroad. The memorandum did not find favor with the Board, and Secretary Laine was appointed a committee of one to arrange a memorandum so as to agree with the provisions of the resolution of purchase of the spur and pipe-line at the quarantine station.

On motion of Dr. Wiard, the Secretary was instructed to consult the attorney for the State Board of Health, to ascertain the powers of the Board with reference to the pollution of the streams by sewage, and to proceed to the abatement of any such nuisance found to exist, if authority is shown to inhere in the State Board of Health.

The Secretary was instructed to reply to communications relating to the purchase of antitoxine.

The Secretary was also instructed to consult the Attorney for the State Board of Health as to the necessity of enforcing Section 3080 of the Political Code, at San Mateo.

The communication from Dr. Lathrop was referred to the Attorney for the Board; as was also the letter of M. Thornburg, of Santa Maria.

The Secretary was instructed to correspond with all public institutions, in case of suspected impure water-supply, to have it analyzed by the State Analyst.

Inspection of State institutions, on motion of Dr. Nutting, was postponed until the January meeting of the Board.

On motion of Dr. Wiard, the Secretary was authorized to employ a typewriter to write the necessary correspondence relating to the Board's action, and to perfect the contract for the spur and pipe-line at Cabazon Station.

The report of Dr. M. F. Price, as Sanitary Inspector in Southern California, was received and ordered printed in the transactions of the Board. The report is as follows:

LOS ANGELES, CAL., October 1, 1895.

J. H. DAVISSON, M.D., *President State Board of Health:*

DEAR DOCTOR: On the 23d of April, 1895, you honored me with the appointment of "Sanitary Inspector and Quarantine Officer for the California State Board of Health, to act within the State and on the line of the Southern Pacific Railway," and instructed me to proceed at once to Yuma, Arizona, and enter on the work of guarding our State against the invasion of smallpox, which was prevailing in Southern Arizona and Sonora, Mexico. After my arrival at Yuma I received my commission and instructions, as follows, viz.:

"OFFICE OF CALIFORNIA STATE BOARD OF HEALTH, }
SACRAMENTO, April 23, 1895. }

"Dr. M. F. PRICE, *Los Angeles, Cal.:*

"DEAR DOCTOR: You are hereby appointed Sanitary Inspector for the State Board of Health, to act between Yuma and such point to the west of the Salton Desert as may be convenient.

"Enclosed printed slip* is the law under whose authority you will act as the agent of the Board, and which you are to regard as part of your instructions.

"You will place yourself in communication with Dr. Goodfellow, east of Yuma, and, if necessary, with the inspector of the U. S. Marine Hospital Service, with reference to the prevalence of smallpox in Arizona.

"You will inspect all trains coming into the State, and if you should find people afflicted with the disease, or have evidence that they are bringing infection into the State, you will take such action as you may deem necessary with reference to detaining passengers or trains for disinfection. Inasmuch as a good deal must be necessarily left to your discretion, it is the wish of the Board that no arbitrary or unnecessary action be taken.

"You will supply yourself with reliable vaccine virus, and not only cause trainmen to be vaccinated, but also insist upon thorough vaccination of any who are known to have recently come from an infected locality.

"You will keep me advised frequently of any action you may take.

"The Board knowing you to be a man of experience, it is not deemed necessary to give you specific directions concerning disinfection of persons, clothing, or trains. It is the opinion of the Board that Cabazon Station should be the point of detention, as a quarantine station is to be established at that point on land soon to be acquired for that use by the State.

"Yours very respectfully,

"[SEAL.]

"J. R. LAINE,
"Secretary State Board of Health."

I arrived at Yuma, April 24, 1895, and at once entered on the work assigned me. To work "within the State" I had to make a daily trip to Indio and return. This involved a ride of 238 miles each day across the Salton Desert, during the hottest season of the year. I soon learned that this was too much for the physical endurance of any man, so cast about for a remedy. I wrote to Dr. Goodfellow, Territorial Health Officer of Arizona, and, by his aid, arranged for a conference with the Governor of the Territory at Phoenix. We had this conference on the 4th of May, and on the 6th I again met the Territorial Health Officer at Tucson. Through these officers and officials of the Southern Pacific Company I was enabled to inspect incoming trains on the east side of the Colorado River. All necessary details to make my work effective were arranged and carried out.

Dr. Goodfellow inspected the trains at Tucson, and sent me daily reports. The Station Agent at Gila Bend telegraphed me whenever any passengers boarded the train at that station for California points, so that I was prepared for their thorough examination on arrival at the point where I inspected the train.

Dr. W. F. Chenoweth, of the Marine Hospital Service at Nogales, kindly coöperated, and sent me information frequently.

I inspected all passenger trains coming into the State, and freight trains when there were any passengers on board; vaccinated those who had been in or near the infected territory, and used every precaution deemed necessary.

I retained my headquarters at Yuma until a change in the railroad time-table (July 15th) brought the principal passenger train at Yuma in the night. I then changed to

*Sections 1, 2, and 3, of "An Act to prevent the introduction of contagious or infectious diseases into the State of California."

Indio, where I remained during the rest of the service—to September 27th—when I was relieved.

During my term of service smallpox was epidemic and severe at several points in Arizona and Sonora, Mexico, there being in all, as nearly as I am able to compute from data at my command, not less than three hundred and fifty or four hundred cases. The death-rate I am unable to determine. The points in Arizona visited by the disease were Nogales, Bisbee, Solomonville, Sonoita, Washington Camp, Oro Grande, Arivaca, and perhaps other places. In Sonora it was the worst at Nogales and the Minas Prietas and Arizpe Mining Districts. In Minas Prietas it was reported to me that there were one hundred and seventy cases at one time, and up to that date there had been fifty deaths. There were still a few cases in Sonora at the time of my leaving, but it was thought to be safely under control.

I was heartily seconded in my work by the officers and health authorities of Arizona, and the officials and employés of the Southern Pacific Company, and I desire to especially thank Hon. D. C. Hughes, Governor; Dr. George Goodfellow, Health Officer; Dr. W. F. Chenoweth, Marine Hospital Service at Nogales; Dr. H. W. Fenner, Tucson; Dr. R. M. Dudley, Solomonville; Superintendent Muir, and the conductors and brakemen of the Southern Pacific Company.

I herewith hand you all correspondence, telegrams, inspection reports, etc., pertaining to the epidemic, and received by me while on duty.

With gratitude to yourself and the Secretary of your Board, for your uniform kindness to me during my term of service as Sanitary Inspector, under your direction, I am, Doctor,

Yours very respectfully,

M. F. PRICE, M.D.

The Board then adjourned.

JANUARY 15, 1896.

The Board met at Stockton, to inspect the asylum for the insane located therein. There were present Drs. Davisson, Ruggles, and Laine, and Hitchcock, of Los Angeles, by invitation.

A full inspection of the asylum revealed a complete transformation of the entire institution. The kitchens were in good condition. Natural gas is used as a fuel. There have been changes made in the grounds by filling, and landscape gardening. The wards, lavatories, and closets were clean, newly painted and tinted, and altogether there was an air of neatness and quiet discipline everywhere about the premises. In connection with the kitchen, all the beef bones are crushed and boiled for fat, marrow, and gelatin. The Superintendent estimates a saving of \$5 in fats and soap stock for every animal consumed, by this treatment of the bones. Three plunge-bath tanks have been constructed, 25 x 50 feet in dimensions, to enable patients to bathe frequently. The water supplied to the tanks is adequate, and comes from artesian wells on the grounds; it flows by natural pressure, and is about 88° Fahr. The meat, vegetables, and other subsistence supplies were of good quality.

JANUARY 15, 1896.

Regular stated meeting at Sacramento. Present: Drs. Davisson, Ruggles, Wiard, and Laine.

Letters from H. K. Mulford & Co., with reference to purchase of anti-toxine, were read, and, on motion of Dr. Wiard, the matter was referred to the Secretary, except that an American brand shall be preferred, and Parke, Davis & Co.'s be obtained where everything is equal.

The new contract for a quarantine station at Cabazon Station was signed by those present, and the contract was ordered forwarded to absent members for their signatures.

A letter from the Code Commissioners, with reference to desired changes in the health laws of the State, was referred to the Secretary,

with instructions to consult with the Attorney-General on the subject, and then confer with the Code Commission.

On motion of Dr. Wiard, the time set for holding the Fourth Annual Sanitary Convention was fixed for 10 A. M., April 20, 1896, and the place determined on was Los Angeles. Drs. Davisson and Laine were appointed a committee to provide a hall and make all necessary arrangements for holding the convention. The Secretary was directed to invite contributions of short papers to be read at the convention.

The Secretary was also instructed to have the names of all the members of the Board printed on all the preventive disease circulars hereafter published by the Board for free distribution.

Dr. Davisson submitted a report of the late sanitary inspector for smallpox, Dr. M. F. Price, which was ordered received and printed in the biennial report.

JANUARY 16, 1896.

Present: Drs. Davisson, Ruggles, Wiard, and Laine, and Dr. Hitchcock by invitation.

The Board proceeded to an inspection of Folsom Prison. The sanitary condition of this prison is as perfect as practicable. An improvement has been made by the construction of a new dining-room and kitchen. The kitchen is equipped with modern ranges and caldrons. The floors are cemented, and the structure has the most substantial appearance. The prison continues to discharge its sewage into the American River.

The Board determined to take steps to prevent the pollution of streams by sewage.

JANUARY 17, 1896.

The Board met at Napa Asylum for the Insane, to inspect the same. Present: Drs. Davisson, Ruggles, Wiard, and Laine, and Dr. Hitchcock by invitation.

The site for the buildings is admirable, and the location is beautiful. The external architecture is graceful, and ornamented with a carved stone portico. The internal arrangement of the Administration Building is abominable. The corridors are wide, with wide stairs flanked with imposing columns. The stairs and corridors are insufficiently lighted by windows opening on the side, which are dimmed by stained glass. This space is a total waste, but it is a fault of construction. Detached buildings should be constructed for officers and their families. The wards showed evidence of due care for the welfare and comfort of patients. They were clean, and the bedding was sufficient. The closets and lavatories were clean, but patchy. Where plaster has fallen, it has been replaced but not tinted over. The plumbing needs painting; also the base-boards of the wards and some dormitories. Paint, whitewash, and tinting are not expensive, and add greatly to the appearance of a public institution. The kitchens and dining-rooms were in good condition, but the kitchen equipments were of ancient pattern, which are still serviceable. The bakery was untidy, and should be overhauled and inspected daily. The food-supplies were of good quality, except the potatoes, which were pitted and warty. The laundry was in a serviceable condition.

From Dr. Dozier's statement, supplemented by that of Dr. Smith, the water-supply is inadequate for the purposes of the institution. There

is insufficient pressure in the closets at this time, and Dr. Dozier stated that during the summer water did not run in the buildings for four or five hours at a time during the day, and that such a condition was of common occurrence. Under such circumstances, the bathing facilities must be greatly restricted. No time should be lost in securing an ample supply of water for all purposes. The sewer system has been completed and is satisfactory.

The Board would recommend that a sufficient water-supply be obtained; that the base-boards in wards, corridors, lavatories, and dormitories, where defaced, be repainted; that walls, where patched, be newly kalsomined or tinted; that the traps and exposed plumbing be repainted; also, that the fifty remaining wooden bedsteads be dispensed with and iron ones obtained in their stead. Folsom Prison makes a strong iron bedstead at an expense of \$1 80 apiece. The Board would further recommend a daily inspection of kitchen, bakery, and laundry by the Superintendent, or by one of his medical staff, and a rigid enforcement of scrupulous cleanliness in each department.

JANUARY 18, 1896.

The Board met at the Home for Feeble-Minded Children, at Glen Ellen. Present: Drs. Davisson, Ruggles, Wiard, Laine, and Dr. Hitchcock by invitation.

The Home, in all matters under the direct control of the Superintendent, was in an excellent sanitary condition. The kitchen was clean, and food-supplies of good quality. The wards were clean and the walls in good repair. There was ample evidence of adequate care and interest in the unfortunate inmates to justify the unqualified approval of the Board. The Board would, however, suggest the erection of detached cottages for the segregation of consumptive children, deformed children, and those of irreclaimable filthy habits, who cannot be instructed into a fitness for civil life. We think such structures, if erected for economy, would be of greater benefit than the architectural monstrosities builded by the State. They should be cheaply built, but lighted and heated from a central source. Jacketed steam-pipes run through an iron-stone sewer-pipe covered with earth may be used to convey heat. A suitable kitchen at a central point should prepare all the food. While, in one sense, exposure of inmates to infection of tuberculosis would be a benefit by ridding the State of incurable defectives, yet inasmuch as the State has undertaken their care and education, it should adopt all the expedients known to prolong their lives in any stage of their mental development.

Observation and experience have shown that adequate ventilation is expensive, difficult, and well nigh impossible in large brick and stone buildings. The habits of the feeble-minded make it necessary that rooms should be well ventilated.

The Board further recommend that facilities be obtained for an upright bath, especially for epileptic children.

The Board then adjourned to San Francisco, where Drs. Ruggles, Laine, and Wiard were appointed a committee to visit Ukiah at an early date, and report on the condition of the State Insane Asylum located at that place.

Drs. Ruggles and Laine were appointed a committee to obtain data

with reference to pollution, by sewage or otherwise, of the waters of the larger rivers in the northern part of the State, and to formulate a report on the subject.

The Board then adjourned.

APRIL 16, 1896.

Regular meeting of the State Board of Health, at Los Angeles. The Board proceeded to Indio, there being present Drs. Davisson, Ruggles, Wiard, and Laine, with Dr. W. G. Cochran by invitation.

APRIL 17, 1896.

The Board proceeded to Cabazon Station, and inspected the railroad spur and water pipe-line, with four faucets attached, for permanent quarantine station, and returned to Los Angeles.

APRIL 18, 1896.

The Board proceeded to San Diego, to inspect the Government quarantine plant at its station, but as it is as yet in an incomplete state, no detailed description is attempted.

The Board returned to Los Angeles to attend the Fourth Annual State Sanitary Convention on the 20th.

APRIL 20, 1896.

The Board met in attendance on the State Sanitary Convention. Present: Drs. Davisson, Ruggles, Wiard, Remondino, and Laine. An extended program of valuable papers was read and referred to the Committee on Publication, with instructions to have them printed in the Fourteenth Biennial Report of the State Board of Health.

Dr. J. H. Davisson was elected President of the State Sanitary Convention, and Dr. Thomas Ross, Secretary.

APRIL 22, 1896.

The Board met at the rooms of the Governor, at the Nadeau House, Los Angeles, agreeable to appointment. There were present Drs. Davisson, Wiard, Ruggles, Remondino, and Laine.

The Governor expressed the opinion that the statutes would enable the Board to declare the required cattle quarantine and would provide for the payment of inspectors to guard the lines and make the necessary investigations to ascertain how much territory was infected. He advised that the Board consult the Attorney-General.

APRIL 23, 1896.

The quarterly meeting of the State Board of Health was held in Los Angeles, at the office of Dr. Davisson. Present: Drs. Davisson, Wiard, Ruggles, Remondino, and Laine.

On motion of Dr. Remondino, the spur-track, pipe-line, and land at Cabazon Station were accepted, and the bills for construction and purchase were ordered paid, as per contract.

A letter relating to an alleged spring of water near San Diego, said to make hair grow on bald heads, was referred to Dr. Remondino.

The Secretary was directed to take the necessary steps to prevent pollution of rivers by sewage.

The Secretary was instructed to continue the purchase of diphtheria antitoxine from Parke, Davis & Co., of Detroit, Michigan; also, to supply Drs. Nutting and Remondino with syringes for antitoxine.

All bills incurred in holding the Sanitary Convention were ordered paid.

Drs. Ruggles and Laine reported having visited the Mendocino State Asylum on February 17, 1896, and that everything was in excellent sanitary condition.

The Board proceeded to elect officers for the ensuing year. Dr. W. F. Wiard was unanimously elected President, and Dr. J. R. Laine Secretary.

On motion of Dr. Ruggles, Dr. J. R. Davisson was tendered a vote of thanks for the many courtesies extended to the Board during its meeting at Los Angeles.

Drs. Ruggles, Wiard, and Laine were appointed a committee, with power to act, with reference to all matters relating to cattle quarantine, and to conduct investigations with reference to the existence of contagious diseases among cattle.

Drs. Ruggles and Laine, the Committee on Sacramento and American Rivers Pollution, submitted a report, which was ordered printed in the biennial report. It is as follows:

To the State Board of Health:

GENTLEMEN: Your committee, on March 9th, investigated the matter of river pollution by sewage, at Redding. By personal inspection it was ascertained that the sewage is carried out of the town by a twelve-inch pipe, when it falls into an open ditch running a quarter of a mile to a farm of sterile land, where it is used for irrigation and fertilization. In seasons of high water the sewage must necessarily find its way into the streams. The disposition of the Redding sewage is so far satisfactory, and commendable to that progressive city.

RED BLUFF.

An investigation was next made at Red Bluff. This beautiful town is admirably situated for drainage. The river at this point rushes madly by in a swirl that erodes the west bank into a lofty escarpment of reddish clay, which gives the town its name. An easy grade carries all surface water to the river by natural easement. The sewage of about nine blocks is run into the river by twelve-inch pipes. The remainder of the city has no sewers.

The quantity of sewage discharged into the river at this point is not sufficient to injure the water taken for municipal use below. The racing swiftness of the stream comminutes it, and long before it reaches any point where water is taken for household uses the sewage has become oxidized and destroyed. It is only when disease germs, such as those of typhoid fever and cholera, pass through the sewers into the river that fears may rightfully be entertained of contamination of the river by Red Bluff sewage in its present condition.

CHICO.

It was next ascertained that Chico has no system at all. Provision has been made for easement of storm water, but the need for an adequate sewer system has not yet been brought home to the people of Chico. The facilities are ample. There is sufficient grade to poor lands down-stream which could be fertilized to great profit by the sewage of the town. Here are all the evidences of an easy prosperity. The water is lifted from wells that have no surface contamination, and the result is an absence of typhoid fever. When Chico awakens to the abolishment of her vile cesspools and constructs a comprehensive system of sewers, she will treble her population and double her money value. The soil is rich and porous. Little effort is needed to dispose of accumulations of years. The soil becomes saturated in limited areas. The cesspool or fecal odor is prevalent. This is not only disagreeable, but is also productive, in a region where more or less malaria exists, of various disorders. Yet Chico is a comparatively healthy town. This may be attributed to a good water-supply.

MARYSVILLE.

This historical city is most unfortunately situated, being at the confluence of two streams, each bearing torrents of sand and debris from the mines situated eastward. Her once rich orchards are covered fathoms deep by rolling sand dunes. Where once were fertile soil, rich gardens, and stately fruit trees, is now seen the wild willow struggling in the sand. It is a scene that impresses one with a depressing sense of destruction and desolation.

Yet, strange as it may appear, Marysville is a progressive city. She is the only town north of Sacramento which has of late years increased in population. She is walled in by protecting levees to guard against the mad rush of winter floods. Her streets are below the high river-beds. All of her storm water is pumped over her levees. Provision has been made for the collection of storm water, but none for sewage, except in one instance, and this is available only during low water.

The abominable cesspool system is in vogue, though an attempt to inaugurate the dry-earth system has been made. Yet the city is healthy. This is explained by the fact that excellent water is obtained from deep wells in the heart of the city. Here, as in all cities obtaining water incapable of contamination at its source, typhoid fever is notably absent. But the cesspool and fecal odor is here. When the rains come the cesspools are flooded, and the contents float to the surface of the ground and under houses. The hot sun then comes to desiccate and disinfect, but the emanations are nevertheless a nuisance that gives rise to offensive effluvia.

Marysville has no great engineering difficulties to overcome in order to effectually dispose of her sewage. A pit, or several pits, should be sunk deep enough to make a sufficient grade for all the city sewage. The pit, or pits, should be cemented to prevent seepage. All sewage proper should be conducted to this point, when it should be pumped into a pipe resting on a bridge across the old channel of the Yuba River, flowing by gravity to the sands on the other side, where Chinese gardeners would gladly utilize it on gardens. The storm water should be treated as at present. The two should not run together.

The sloughs inside the city limits are being filled, the streets are clean, and there is an air of neatness and comfort in the city, in wide contrast with the devastation by sand and water contiguous to it.

COLUSA.

We append hereto a letter from Colusa, relating to the disposal of sewage at that point:

"I give the following answers to your questions:

"First—We have no sewer system. We have shallow ditches, some of which are lined with plank, to convey the rainwater out of town.

"Second—Our drainage is away from the river. We have a fall of eight feet to the mile. All drainage runs to the south from the river and the town.

"Third—There are no private sewers discharging into the river at this point.

"I am considering what to do with the garbage. I am thinking over the crematory idea. This is a problem with small as well as large towns."

The above is an extract from a letter from Dr. J. S. West, Health Officer of Colusa.

EFFECT ON THE RIVER.

From the foregoing it may be inferred that we do not regard the river pollution by these towns on the Sacramento River and its tributaries as serious. This would not be precisely consonant with the facts. The distance between the towns taking water from the river, the swiftness of the streams, and several other factors, prevent the sewage from producing appreciable bad effects. In case, however, that typhoid fever or cholera were to prevail at any of these points, or on the tributaries of streams flowing into the Sacramento River, the result might be very fatal to life. This would be worse after the first rains in autumn, when the surface filth is quickly washed into the streams, creating an abnormal quantity of organic impurities, in which disease germs multiply rapidly and infinitely.

The situation at Sacramento with reference to water from the Sacramento River has to be considered separately.

In addition to any impurities that may reach the rivers from towns on the main streams or its tributaries, it is largely polluted by the outflow from the broad tule basins, comprising thousands of acres of overflowed lands having considerable depth of water in places. These basins do not begin to fall until the season is well advanced. Great numbers of fishes go into these basins to spawn, and when the warm weather comes on myriads of them die. There are numerous alfalfa fields around these low lands, and great numbers of hogs. When hog cholera prevails the carcasses of the dead hogs are thrown into the water and lazily float into the river. Several hundred of these carcasses have been seen resting on sandbars in the river during hot weather. Later in the summer the water that runs out of the tule basins is greenish in color. This pollution can scarcely be abated by the State.

FOLSOM PRISON

Pours its sewage directly into the American River, twenty-two miles above Sacramento, and the town of Folsom, two miles below the prison, disposes of its sewage in the same manner. The American River is a rapid but shallow stream, that empties into the Sacramento River less than half a mile above the intake of the Sacramento water-supply.

The sewage of convicts and the people of Folsom in a shallow, warm stream, which furnishes none too much dilution of sewage, must be more palatable than it might seem, for the citizens of Sacramento seem to prefer it to the available deep-well water contiguous to them. Add this diluted sewage of the American River to the water from the tule basins, in warm weather when it smells badly, and it makes a combination or culture fluid for disease germs which would enable them to multiply infinitely and jeopardize many lives.

DEEP-WATER WELLS.

Dr. W. A. Briggs, of Sacramento, has recently informed us that the result of a number of analyses made by him when the Sacramento River was low, showed an excess of albuminous substances from eight to nineteen times above normal. Such an excess of organic impurities cannot be poohpoohed or argued away by those who adhere to the ancient notion that running streams always purify themselves, no matter what degree of pollution may exist. They do not seem to comprehend the possibility of a degree of impurities which cannot be oxidized in a limited body of water, and in limited time and agitation.

There is an abundance of very excellent water to be obtained from deep wells, both within and just without the Sacramento City limits. This water rises nearly to the surface, and would cost no more to lift it than it costs to lift from the river. To obtain water from such a source would place Sacramento beyond the necessity of complaining of towns up-stream for polluting the river with their sewage, and would make it, moreover, safe from typhoid fever, cholera, and malarial fever germs, which are recognized as water-born diseases.

C. A. RUGGLES, M.D.,
J. R. LAINE, M.D.,

Committee on Sacramento and American Rivers Pollution.

The Board then adjourned.

J. R. LAINE, M.D.,
Secretary.

WATER-PROOFING

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SECRETARY'S REPORT.

SECRETARY'S REPORT.

To the State Board of Health:

GENTLEMEN: The reprinting of the monthly reports of the State Board of Health is done to enable any one to review the reports from different localities, and to compare the monthly report with the official report of twenty-five counties condensed into the subjoined tables.

It is unnecessary to write out the totals of mortality for the two years from any one cause, as a glance at the tables will show the exact figures, so far as they have been collected. The monthly circular will also aid.

It will, in my opinion, be necessary to invoke legislative aid to enforce the law with reference to the collection of vital statistics. No reports have been received from thirty-two counties. The Recorders of these delinquent counties are liable to a fine for each neglect, but the Board of Health cannot force them to report nor have them fined, unless the District Attorneys proceed against them.

I have prepared no tables of births and marriages, owing to the incompleteness of the reports received.

I have published circular No. 5, on "Consumption (Pulmonary Tuberculosis); Its Restriction and Prevention," which will be found in this report, and have incorporated in this report a very comprehensive paper: "A Study of Milk in Relation to Health and Disease," by Dr. George M. Kober, of Fort Bidwell, Cal. The financial report is hereto appended, and there is added the transactions of the Fourth Annual Sanitary Convention.

Very respectfully,

J. R. LAINE, M.D.,
Secretary.

FINANCIAL STATEMENT.

ACCOUNT CONTAGIOUS AND INFECTIOUS DISEASES.

Forty-sixth Fiscal Year, ending June 30, 1895.

Unexpended balance from forty-fifth fiscal year.....		\$49,630 52
1894—July 12—Controller's warrant No. 280	\$25 00	
Aug. 1—Controller's warrant No. 1126	18 00	
Aug. 9—Controller's warrant Nos. 1313-1314	133 20	
Aug. 18—Controller's warrant No. 1651	25 00	
Oct. 2—Controller's warrant No. 3163	12 00	
Nov. 2—Controller's warrant No. 4291	295 00	
1895—Jan. 7—Controller's warrant Nos. 6979-6981	682 73	
Apr. 25—Controller's warrant No. 16026	14 00	
Apr. 25—Controller's warrant No. 16038	12 65	
June 4—Controller's warrant Nos. 17469-17471	145 75	
June 29—Controller's warrant No. 18146	11 85	
Unexpended balance	48,255 34	
		\$49,630 52

REPORT OF THE STATE BOARD OF HEALTH.

Forty-seventh Fiscal Year, ending June 30, 1896.

Unexpended balance from forty-sixth fiscal year		\$48,255 34
1895—July 16—Controller's warrant Nos. 127-128	\$565 48	
July 27—Controller's warrant No. 731	286 00	
Sept. 7—Controller's warrant No. 3729	290 85	
Sept. 7—Controller's warrant No. 3741	18 77	
Sept. 21—Controller's warrant No. 4595	16 00	
Sept. 23—Controller's warrant No. 6026	40 00	
Oct. 21—Controller's warrant No. 6841	287 00	
Oct. 23—Controller's warrant No. 6950	280 58	
Nov. 9—Controller's warrant No. 7747	163 43	
1896—June 25—Controller's warrant No. 16922	3,010 00	
Unexpended balance	43,317 23	
		<u>\$48,255 34</u>

ACCOUNT TRAVELING AND CONTINGENT EXPENSES.

Forty-sixth Fiscal Year, ending June 30, 1895.

Appropriation March 25, 1893	\$1,500 00
Unexpended balance from forty-fifth fiscal year	404 37

		\$1,904 37
1894—July 12—Controller's warrant Nos. 258-259	\$96 85	
Aug. 9—Controller's warrant Nos. 1311-1312	69 10	
Aug. 18—Controller's warrant No. 1652	12 50	
Sept. 13—Controller's warrant No. 2469	24 35	
Sept. 13—Controller's warrant No. 2470	37 10	
Oct. 3—Controller's warrant No. 3218	79 15	
Oct. 20—Controller's warrant No. 3703	50 20	
Oct. 25—Controller's warrant No. 4033	52 40	
Nov. 2—Controller's warrant No. 4290	52 65	
Nov. 15—Controller's warrant No. 4729	31 20	
Dec. 3—Controller's warrant Nos. 5604-5605	57 75	
Dec. 17—Controller's warrant No. 6081	31 65	
1895—Jan. 7—Controller's warrant No. 6081	39 15	
Feb. 21—Controller's warrant Nos. 11395-11397	114 40	
Mar. 22—Controller's warrant Nos. 14321-14324	130 50	
Apr. 23—Controller's warrant No. 15985	35 60	
May 11—Controller's warrant Nos. 16570-16572	111 50	
May 17—Controller's warrant Nos. 16673-16674	100 45	
May 23—Controller's warrant Nos. 16921-16922	55 93	
June 4—Controller's warrant Nos. 17472-17473	41 15	
June 22—Controller's warrant Nos. 18096-18100	332 15	
Unexpended balance	348 64	
		<u>\$1,904 37</u>

Forty-seventh Fiscal Year, ending June 30, 1896.

Appropriation March 28, 1895		\$1,500 00
1895—Aug. 3—Controller's warrant Nos. 1473-1475	\$113 27	
Aug. 3—Controller's warrant Nos. 1476-1477	96 35	
Sept. 21—Controller's warrant No. 4596	47 60	
Sept. 28—Controller's warrant No. 5027	39 80	
Sept. 28—Controller's warrant Nos. 5029-5032	105 45	
Oct. 21—Controller's warrant Nos. 6842-6843	62 50	
Oct. 25—Controller's warrant Nos. 6923-6924	49 00	
Nov. 4—Controller's warrant No. 7638	41 70	
Dec. 14—Controller's warrant No. 10172	33 65	
1896—Jan. 4—Controller's warrant No. 11007	39 65	
Feb. 10—Controller's warrant Nos. 12318-12319	79 72	
Feb. 13—Controller's warrant No. 12401	78 40	
Feb. 17—Controller's warrant No. 12452	38 65	
Feb. 25—Controller's warrant No. 12760	28 85	
Mar. 2—Controller's warrant No. 13082	32 00	
Mar. 23—Controller's warrant No. 13716	50 90	
Mar. 30—Controller's warrant No. 13733	69 45	
Apr. 6—Controller's warrant No. 14289	35 70	
May 11—Controller's warrant Nos. 15415-15417	299 30	
May 19—Controller's warrant No. 15761	130 90	
Unexpended balance	27 16	
		<u>\$1,500 00</u>

ACCOUNT PURCHASE AND MANUFACTURE OF DIPHTHERIA ANTITOXINE.

Forty-sixth Fiscal Year, ending June 30, 1895.

Appropriation March 12, 1895		\$6,000 00
1895—May 11—Controller's warrant No. 16569	\$108 80	
May 17—Controller's warrant No. 16675	168 64	
Unexpended balance	5,724 56	\$6,000 00

Forty-seventh Fiscal Year, ending June 30, 1896.

Unexpended balance from forty-sixth fiscal year		\$5,724 56
1895—July 16—Controller's warrant No. 126	\$127 20	
Aug. 3—Controller's warrant No. 1478	103 85	
Sept. 28—Controller's warrant No. 5028	15 60	
Oct. 21—Controller's warrant No. 6840	100 30	
Nov. 19—Controller's warrant No. 8324	100 15	
Dec. 14—Controller's warrant No. 10171	100 80	
1896—Jan. 4—Controller's warrant No. 11019	104 90	
Jan. 21—Controller's warrant No. 11533	202 15	
Feb. 10—Controller's warrant No. 12309	2 50	
Feb. 17—Controller's warrant No. 12451	102 70	
Mar. 23—Controller's warrant No. 13715	114 10	
Apr. 11—Controller's warrant No. 14327	102 10	
June 23—Controller's warrant No. 16892	30 60	
Unexpended balance	4,517 81	\$5,724 56

MONTHLY HEALTH REPORTS.

[illegible]

ABSTRACT FOR JULY, 1894—Continued.

Cities and Towns.	Estimated Population	Total Deaths	Consumption	Acute Pneumonia	Acute Bronchitis.	Congestion of the Lungs	Diarrhoea and Dysentery	Cholera Infantum.	Other Diseases of St'mach & Bow'ls	Diphtheria	Croup	Scarlet Fever	Measles	Smallpox	Whooping-Cough	Typhoid Fever	Remittent and Intermittent Fevers	Cerebro-Spinal Fevers	Cancer	Erysipelas	Heart Diseases	Alcoholism	Other Causes	
Redlands and vicinity	3,600	8	2	-	-	-	-	1	1	-	-	-	-	-	-	1	-	-	-	-	-	-	4	
Rio Vista and vicinity	1,800	7	-	-	-	-	-	3	2	-	-	-	-	-	-	1	-	-	-	-	-	-	3	
Sacramento	30,000	33	6	-	-	-	-	2	2	-	1	-	-	-	-	-	-	-	-	-	2	-	18	
San Bernardino	8,500	11	3	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	1	-	2	
San Diego	18,000	11	2	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	6	
San Francisco	330,000	489	79	28	18	7	2	8	43	1	-	1	1	-	3	8	47	3	17	1	47	3	219	
San José	25,000	20	4	2	-	-	1	1	1	-	-	-	-	-	1	1	1	-	-	-	1	-	8	
San Luis Obispo	3,000	7	2	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-	3	
San Pedro	1,250	1	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	1	-	1	
Santa Ana and vicinity	10,000	15	4	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	2	-	6	
Santa Barbara	5,864	10	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-	5	
Santa Maria	1,000	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	
Santa Rosa	5,216	6	-	-	-	-	-	1	1	-	-	-	-	-	-	1	-	-	-	-	-	-	2	
Santa Paula and vicinity	2,000	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	6	
Sausalito	1,200	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	
Stockton	17,000	16	6	1	1	-	1	1	1	-	-	-	-	-	-	1	1	1	-	-	1	1	6	
St. Helena and vicinity	2,000	4	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	
Solano County, District No. 2	2,000	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	
Soquel	250	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	
Tehama	350	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	
Truckee and vicinity	1,300	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	
Tulare City	4,000	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	
Upper Lake	300	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	
Vallejo	6,000	7	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	1	3	
Vacaville and vicinity	4,500	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Watsonville and vicinity	3,000	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Williams	600	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Woodbridge	300	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Totals	777,020	961	147	45	26	9	10	25	84	4	2	2	1	0	4	28	4	8	28	4	88	-	8	434

Pomona and vicinity	5,000	7	3	--	--	--	--	--	1	--	--	--	--	--	--	--	--	--	1	--	--	--	3
Pleasanton	2,000	2	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2	--	--	--	1
Redlands and vicinity	3,600	3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--	1
Rio Vista and vicinity	1,800	2	--	--	--	--	--	--	1	--	--	--	--	--	--	--	--	--	1	--	--	--	1
Sacramento	30,000	35	7	2	--	--	--	1	2	--	--	--	--	--	--	--	--	--	1	1	--	3	17
San Bernardino	8,500	10	2	--	--	--	1	1	1	--	--	--	--	--	--	--	--	--	1	1	--	1	3
San Diego	18,000	15	3	--	--	--	--	--	1	--	--	--	--	--	--	--	--	--	1	1	--	1	7
San Francisco	330,000	527	80	22	20	4	5	12	59	6	4	--	--	1	13	--	6	20	3	39	--	3	230
San José	25,000	29	1	--	2	--	--	2	1	--	--	--	--	1	1	--	4	--	1	1	--	1	16
San Luis Obispo	3,000	8	--	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	6
San Pedro	1,000	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1
San Rafael	3,800	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	8
Santa Ana and vicinity	10,000	13	3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2	--	--	2	8
Santa Barbara	5,884	8	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	1	5
Santa Maria	1,000	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1
Sausalito	1,200	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1
Selma and vicinity	3,000	4	1	--	--	--	1	--	--	--	--	--	--	--	--	--	--	--	--	1	--	1	1
Sierra Valley	1,000	0	--	--	--	--	--	--	3	--	--	--	--	--	--	--	--	--	--	--	--	--	8
Stockton	17,000	17	5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1	--	1	2
St. Helena and vicinity	2,800	7	3	--	--	--	--	--	--	--	--	--	--	1	--	--	--	--	--	--	--	3	3
Truckee and vicinity	1,500	4	--	--	--	--	--	--	1	--	--	--	--	--	--	--	--	--	1	--	--	2	2
Tulare City	4,000	3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2
Upper Lake	300	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2
Visalia	6,000	2	1	--	--	--	--	--	1	--	--	--	--	--	--	--	--	--	--	2	--	--	2
Vacaville and vicinity	4,500	4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2
Williams	800	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Woodland	3,500	2	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--
Totals	777,053	1,002	163	41	28	5	16	23	94	9	7	1	0	0	6	33	5	7	35	4	76	6	445

SEPTEMBER, 1894.

Reports from 78 cities, towns, villages, and sanitary districts, aggregating a population of 760,875, show a mortality of 957—a death-rate of 1.25 per 1,000 for September, or 15.00 per 1,000 per annum.

There were 145 deaths from consumption, 47 from pneumonia, 20 from bronchitis, 4 from congestion of the lungs, 25 from diarrhoea, 47 from cholera infantum, 61 from other diseases of the stomach and bowels, 4 from diphtheria, 12 from croup, 1 from scarlatina, 3 from measles, 3 from whooping-cough, 33 from typhoid fever, 5 from malarial fever, 10 from cerebro-spinal fever, 28 from cancer, 3 from erysipelas, 75 from diseases of the heart, 12 from alcoholism, 418 from other causes, 1 of which was from la grippe.

PREVAILING DISEASES.

Reports from 46 localities outside of the larger cities and towns give 23 cases of pneumonia, 57 of bronchitis, 24 of pleurisy, 14 of congestion of the lungs, 181 of diarrhoea, 27 of dysentery, 23 of cholera morbus, 33 of cholera infantum, 6 of diphtheria, 12 of croup, 9 of measles, 38 of whooping-

[illegible]

Abstract of the Reports of Deaths and their Causes in the following Cities and Towns of California during October, 1894.

Cities and Towns.	Estimated Population	Total Deaths	Consumption	Acute Pneumonia	Acute Bronchitis	Congestion of the Lungs	Diarrhœa and Dysentery	Cholera Infantum	Other Diseases of St'mach & Bow'ls	Diphtheria	Croup	Scarlet Fever	Measles	Smallpox	Whooping-Cough	Typhoid Fever	Remittent and Intermittent Fevers	Cerebro-Spinal Fevers	Cancer	Erysipelas	Heart Diseases	Alcoholism	Other Causes
Alameda	14,000	13	2	1																1		2	7
Anaheim and vicinity	5,000	1	1																				1
Antioch and vicinity	3,000								1														1
Arbutle	500	1																					1
Berkeley	10,000	14	3				1	1	2						1				1				5
Bishop and vicinity	1,500	3					1																
Calico	500	0																					
Colton and vicinity	2,000	1					1																
Concord	500	2	1																				1
College City	700	0																					
Cottonwood and vicinity	1,250	1																					
Cloverdale	1,200	2																					1
Chico and vicinity	8,880	7		1																			1
Dixon and vicinity	2,500	0																					1
Downieville	800	1																					1
Downey and vicinity	2,500	7								1													2
Elk Grove	1,000	4																	1				1
Fallbrook and vicinity	1,200	1																					1
Fort Bidwell and vicinity	1,500	0																					1
Fresno	10,000	8	1				1			1													5
Fresno Flats	600	3																					3
Folsom	2,500	2																					2
Grass Valley and vicinity	7,000	8	1				1		1											1			4
Gridley	2,500	0																					
Highland and vicinity	1,700	0																					
Isleton	800	1								1													
Knights Ferry	1,500	0																					
Lockeford	1,000	3							1														1
Long Beach and vicinity	2,000	1																	1				1
Livermore and vicinity	2,500	3	1																				2
Lincoln	1,000	2		1																			1
Lodi and vicinity	2,000	1																					1
Los Angeles	75,000	101	21	2			1	4	12	11							6					8	34

[illegible]

NOVEMBER, 1894.

Reports from 71 cities, towns, villages, and sanitary districts, aggregating a population of 763,723, show a mortality of 997—a death-rate of 1.30 per 1,000 for November, or 15.60 per 1,000 per annum.

There were 182 deaths from consumption, 68 from pneumonia, 22 from bronchitis, 13 from congestion of the lungs, 11 from diarrhoea, 18 from cholera infantum, 75 from other diseases of stomach and bowels, 11 from diphtheria, 10 from croup, 1 from scarlatina, 1 from measles, 2 from whooping-cough, 23 from typhoid fever, 1 from malarial fever, 50 from cancer, 1 from erysipelas, 83 from diseases of the heart, 3 from alcoholism, and 409 from other causes, 1 of which was from la grippe, and 1 from leprosy.

PREVAILING DISEASES.

Reports from 43 localities outside of the larger cities and towns give 72 cases of pneumonia, 136 of bronchitis, 28 of pleurisy, 27 of congestion of the lungs, 137 of diarrhoea, 111 of dysentery, 16 of cholera morbus, 21 of cholera infantum, 22 of diphtheria, 7 of croup, 7 of scarlatina, 15 of measles, 153 of malarial fevers, 7 of cerebro-spinal fever, 17 of erysipelas, 64 of rheumatism, 72 of neuralgia, 90 of tonsillitis, and 76 of pharyngitis.

Whooping-cough was epidemic at St. Helena and Etna Mills. Three cases of chicken-pox were reported from Forest Hill, and 8 cases of small-pox from Gridley.

It is desired, therefore, that the names of members of the various municipal and district or county boards, with names of officers, be forwarded to me at the earliest convenient date.

Abstract of the Reports of Deaths and their Causes in the following Cities and Towns of California during November, 1894.

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APRIL, 1895.

Reports from 68 cities, towns, villages, and sanitary districts, aggregating a population of 769,109, show a mortality of 975—a death-rate of 1.26 per 1,000 for April, or 15.12 per 1,000 per annum.

There were 168 deaths from consumption, 77 from pneumonia, 34 from bronchitis, 7 from congestion of the lungs, 4 from diarrhoea, 4 from cholera infantum, 70 from other diseases of the stomach and bowels, 8 from diphtheria, 5 from measles, 1 from whooping-cough, 22 from typhoid fever, 1 from malarial fevers, 13 from cerebro-spinal fever, 48 from cancer, 2 from erysipelas, 82 from diseases of the heart, 1 from alcoholism, and 428 from all other causes, 14 of which were from la grippe.

PREVAILING DISEASES.

Reports from 40 localities outside of the larger cities and towns give 39 cases of pneumonia, 122 of bronchitis, 36 of pleurisy, 17 of congestion of the lungs, 75 of diarrhoea, 13 of dysentery, 8 of cholera morbus, 4 of cholera infantum, 7 of diphtheria, 12 of croup, 7 of scarlatina, 54 of measles, 21 of whooping-cough, 467 of la grippe, 9 of typhoid fever, 147 of malarial fevers, 1 of cerebro-spinal fever, 1 of erysipelas, 109 of rheumatism, 84 of neuralgia, 98 of tonsilitis, and 60 of pharyngitis.

Measles were epidemic at Vallejo and National City. Whooping-cough was epidemic at Pomona.

DIPHTHERIA ANTITOXINE.

A sufficient supply of antitoxine has been obtained for general use by sanitary officers and the medical profession. It is free of charge. Requisitions by letter or wire should, when from cities and towns having Health Boards, be made through a sanitary officer; but all requisitions from legal practitioners will be promptly honored, the only return being data concerning its use.

Antitoxine may be obtained by addressing Dr. W. F. Wiard, Sacramento; Dr. C. A. Ruggles, Stockton; Dr. J. H. Davison, Los Angeles; Dr. P. C. Remondino, San Diego, and Dr. Winslow Anderson, San Francisco.

A prompt acknowledgment of the receipt of the packages should be made, with such data as will show by whom and upon whom it was administered, with previous condition and result.

SMALLPOX.

Southern California has been threatened with smallpox by way of the Mexican border of Arizona. There have been a number of deaths, but the inhabitants are being vaccinated and all necessary precautions have been taken by the authorities of the General Government, the Territorial officers, and also by the California State Board of Health. Inspectors have been on duty near Yuma, on either side of the Colorado River, for ten days or more. The latest advices would indicate that a further spread of the disease will be prevented. A general vaccination and re-vaccination is in order as the only sure preventive.

ABSTRACT FOR DECEMBER, 1894—Continued.

Cities and Towns.	Estimated Population	Total Deaths	Consumption	Acute Pneumonia.	Acute Bronchitis.	Congestion of the Lungs	Diarrhœa and Dysentery	Cholera Infantum.	Other Diseases of St'mach & Bow'ls	Diphtheria	Croup	Scarlet Fever.	Measles.	Smallpox.	Whooping-Cough.	Typhoid Fever	Remittent and Intermittent Fevers	Cerebro - Spinal Fevers.	Cancer	Erysipelas.	Heart Diseases	Alcoholism.	Other Causes.
Santa Ana and vicinity	10,000	11	1	2	--	--	--	--	--	1	--	--	--	--	--	--	--	--	--	--	--	--	6
Santa Barbara	5,864	7	1	2	--	--	--	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	3
Santa Rosa	5,216	6	4	--	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1
Santa Maria	1,000	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1
Sausalito	1,200	3	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1
Selma	1,500	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1
Sierra Valley	1,000	3	1	--	--	--	--	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sisson	1,000	2	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1
Stockton	17,000	19	2	1	--	--	--	--	3	--	--	--	--	--	--	--	--	--	--	--	--	--	12
Suisun and vicinity	2,500	1	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Truckee	1,300	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1
Tulare City	3,000	2	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1
Upper Lake	300	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vacaville and vicinity	4,500	4	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2
Watsonville and vicinity	3,000	3	--	--	--	--	--	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	2
Woodland	3,500	1	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1
Totals	791,223	1,061	180	110	32	14	5	12	67	18	11	1	2	0	2	36	3	5	39	0	70	10	444

JANUARY, 1895.

Reports from 69 cities, towns, villages, and sanitary districts, aggregating a population of 705,473, show a mortality of 1,074—a death-rate of 1.52 per 1,000 for January, or 18.24 per 1,000 per annum.

There were 202 deaths from consumption, 67 from pneumonia, 29 from bronchitis, 11 from congestion of the lungs, 4 from diarrhoea, 1 from cholera infantum, 62 from other diseases of stomach and bowels, 12 from diphtheria, 3 from croup, 3 from scarlatina, 2 from measles, 4 from whooping-cough, 23 from typhoid fever, 3 from malarial fevers, 6 from cerebro-spinal fever, 49 from cancer, 4 from erysipelas, 108 from diseases of the heart, 8 from alcoholism, 467 from other causes, 3 of which were from la grippe and 1 from leprosy.

PREVAILING DISEASES.

Reports from 39 localities outside of the larger cities and towns give 45 cases of pneumonia, 161 of bronchitis, 30 of pleurisy, 9 of congestion of the lungs, 47 of diarrhoea, 8 of dysentery, 6 of cholera morbus, 1 of cholera infantum, 11 of diphtheria, 13 of croup, 20 of scarlatina, 57 of measles, 7

of whooping-cough, 125 of la grippe, 32 of typhoid fever, 5 of cerebro-spinal fever, 19 of erysipelas, 84 of rheumatism, 123 of neuralgia, 91 of tonsillitis, and 34 of pharyngitis.

Measles were epidemic at Lakeport, North Pasadena, and Kelseyville. Chicken-pox was epidemic at Truckee, and mumps at Santa Maria.

THIRD ANNUAL STATE SANITARY CONVENTION.

The third annual State Sanitary Convention will be held in San Francisco in April, on the day previous to the meeting of the State Medical Society. An earnest invitation is extended to the health officials of the towns and cities in the State, and to the entire medical profession, and to all persons that may be interested in sanitary work.

Short papers on subjects relating to local sanitary matters will be cordially welcomed, while a general request is made for treatises on any subject relating to preventive medicine.

The papers read at the last convention have been in active demand all over the United States, and have been largely reprinted.

Another notice will be given fixing the place of meeting, and in the meantime those who desire to present papers should send in the title and probable time required to read them.

Owing to the limited time for holding the convention (one afternoon and evening), the number of papers will be limited to fifteen, with the hope that in this instance a greater number of subjects will be covered.

Titles should be promptly forwarded to the Secretary of the State Board of Health.

IMPURITIES IN MILK.

So much has been urged to guard against impurities in milk that it may not be inappropriate to mention in substance a measure that St. Louis proposes. That municipality issues a license to vendors of milk, which stipulates that the right is reserved to inspect the dairy and the methods of caring for animals, and the right also to revoke the license if the condition of the cows and care of the dairy do not meet the requirements of the inspector of the Board of Health. In this way the local Board of Health can exercise supervision over dairies any distance from the city, and if tuberculous cows are found in the herd, may insist that they be removed or the license to bring milk into the city be revoked.

Abstract of the Reports of Deaths and their Causes in the following Cities and Towns of California during January, 1895.

Cities and Towns.	Deaths.		Estimated Population.
	1880.	1881.	
Alturas.....	0	3	550
Alameda.....	14	2	14,000
Anaheim and vicinity.....	3	1	5,000
Anderson.....	1	1	1,000
Arbutle.....	0	0	500
Arbutus and vicinity.....	3	1	2,500
Other Causes.....	5	1	
Alcoholism.....	1	1	
Heart Diseases.....	3	1	
Erysipelas.....	1	1	
Cancer.....	1	1	
Cerebro-Spinal Fevers.....	1	1	
Remittent and Intermittent Fevers.....	1	1	
Typhoid Fever.....	1	1	
Whooping-Cough.....	1	1	
Smallpox.....	1	1	
Measles.....	1	1	
Scarlet Fever.....	1	1	
Croup.....	1	1	
Diphtheria.....	1	1	
Other Diseases of St'mach & Bow'ls.....	1	1	
Cholera Infantum.....	1	1	
Diarrhea and Dysentery.....	1	1	
Congestion of the Lungs.....	1	1	
Acute Bronchitis.....	1	1	
Acute Pneumonia.....	1	1	
Consumption.....	4	1	
Total Deaths.....	50	33	

ABSTRACT FOR JANUARY, 1895—Continued.

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FEBRUARY, 1895.

Reports from 69 cities, towns, villages, and sanitary districts, aggregating a population of 740,073, shows a mortality of 900—a death-rate of 1.21 per 1,000 for February, or 14.52 per 1,000 per annum.

There were 189 deaths from consumption, 81 from pneumonia, 35 from bronchitis, 6 from congestion of the lungs, 2 from diarrhoea, 2 from cholera infantum, 61 from other diseases of stomach and bowels, 7 from diphtheria, 4 from croup, 1 from scarlatina, 1 from measles, 4 from whooping-cough, 22 from typhoid fever, 2 from malarial fevers, 9 from cerebro-spinal fever, 25 from cancer, 5 from erysipelas, 90 from diseases of the heart, 354 from other causes, 3 of which were from la grippe.

Folsom	2,500	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-</
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ABSTRACT FOR FEBRUARY, 1895—Continued.

Cities and Towns.	Estimated Population	Total Deaths	Consumption	Acute Pneumonia	Acute Bronchitis	Congestion of the Lungs	Diarrhoea and Dysentery	Cholera Infantum.	Other Diseases of St'mach & Bow'ls	Diphtheria	Croup	Scarlet Fever	Measles	Smallpox	Whooping-Cough	Typhoid Fever	Remittent and Intermittent Fevers	Cerebro-Spinal Fevers	Cancer	Erysipelas	Heart Diseases	Alcoholism	Other Causes
Tulare City	3,000	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1
Upper Lake	300	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1
Watsonville and vicinity	3,000	2	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--	--	--
Williams	500	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1
Woodland	3,500	5	3	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1
Totals	740,073	900	189	81	35	6	2	2	61	7	4	1	1	0	4	22	2	9	25	5	90	0	354

MARCH, 1895.

Reports from 66 cities, towns, villages, and sanitary districts, aggregating a population of 762,823, show a mortality of 1,132—a death-rate of 1.50 per 1,000 for March, or 18.00 per 1,000 per annum.

There were 212 deaths from consumption, 142 from pneumonia, 51 from bronchitis, 10 from congestion of the lungs, 4 from diarrhoea, 10 from cholera infantum, 55 from other diseases of the stomach and bowels, 6 from diphtheria, 2 from croup, 3 from scarlatina, 4 from measles, 1 from whooping-cough, 14 from typhoid fever, 1 from malarial fever, 12 from cerebro-spinal fever, 45 from cancer, 103 from diseases of the heart, 2 from alcoholism, and 465 from all other causes, 18 of which were from la grippe and 1 from leprosy.

PREVAILING DISEASES.

Reports from 37 localities outside of the larger cities and towns give 52 cases of pneumonia, 132 of bronchitis, 27 of pleurisy, 11 of congestion of the lungs, 55 of diarrhoea, 6 of dysentery, 8 of cholera infantum, 9 of cholera morbus, 8 of diphtheria, 15 of croup, 7 of scarlatina, 67 of measles, 51 of whooping-cough, 401 of la grippe, 10 of typhoid fever, 102 of malarial fever, 1 of cerebro-spinal fever, 13 of erysipelas, 88 of rheumatism, 65 of neuralgia, 73 of tonsillitis, and 64 of pharyngitis.

Whooping-cough was epidemic at Anderson and Lincoln; measles were epidemic at National City; la grippe was reported as being epidemic in a number of localities.

STATE SANITARY CONVENTION.

The third annual State Sanitary Convention will be held at the Academy of Sciences, San Francisco, at 1:30 P. M., Monday, April 15th. There will be an afternoon and evening session.

REPORT OF THE STATE BOARD OF HEALTH.

Cities and Towns.	Estimated Population	Total Deaths	Consumption	Acute Pneumonia.	Acute Bronchitis.	Congestion of the Lungs	Diarrhoea and Dysentery	Cholera Infantum.	Other Diseases of St'mach & Bow'ls	Diphtheria	Croup	Scarlet Fever	Measles	Smallpox	Whooping-Cough	Typhoid Fever	Remittent and Intermittent Fevers	Cerebro - Spinal Fevers	Cancer	Erysipelas	Heart Diseases	Alcoholism	Other Causes
Merced	2,000	3	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Mariposa	1,000	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Madera	2,500	5	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-	1
Napa	7,000	7	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
National City	1,200	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Oakland	60,000	83	13	8	10	-	1	1	2	-	-	1	-	-	-	-	-	-	3	-	8	-	36
Oakland Township	10,000	7	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	2
Oceanside	400	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ontario and vicinity	3,000	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pasadena and vicinity	9,500	23	9	1	-	-	-	-	-	-	-	-	3	-	-	1	-	-	-	-	1	-	8
Palo Alto	1,000	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pleasanton	2,000	3	-	-	-	-	-	-	1	-	-	-	-	-	-	1	1	-	-	-	-	-	1
Redlands and vicinity	3,500	10	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
Rio Vista and vicinity	2,000	3	-	3	1	-	-	-	4	1	-	-	1	-	-	3	-	-	-	-	6	-	1
Sacramento	30,000	49	6	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	25
San Bernardino	8,500	7	2	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	3
San Diego	16,153	18	4	3	1	-	-	-	-	-	-	-	-	-	-	1	-	8	-	-	3	-	6
San Francisco	330,000	609	109	98	80	6	2	4	31	-	2	-	-	-	-	4	-	-	30	1	50	1	234
San Jose	25,000	26	8	2	-	-	-	-	2	-	-	-	-	-	-	1	-	-	1	1	3	-	9
San Luis Obispo	4,000	6	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
Santa Ana and vicinity	10,000	10	-	2	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	3
Santa Barbara	5,884	13	4	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-	3
Santa Rosa	5,216	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	5
Santa Paula and vicinity	2,000	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	3
Selma and vicinity	3,000	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Sierra Valley and vicinity	1,000	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stockton	17,000	18	1	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8
St. Helena and vicinity	1,800	2	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	3	-	2	-	-
Truckee and vicinity	1,300	2	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tulare City and vicinity	2,000	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
Upper Lake	300	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Woodland	3,500	2	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Totals	752,823	1,182	212	142	51	10	4	10	55	6	2	3	4	0	1	14	1	12	45	0	103	2	455

APRIL, 1895.

Reports from 68 cities, towns, villages, and sanitary districts, aggregating a population of 769,109, show a mortality of 975—a death-rate of 1.26 per 1,000 for April, or 15.12 per 1,000 per annum.

There were 168 deaths from consumption, 77 from pneumonia, 34 from bronchitis, 7 from congestion of the lungs, 4 from diarrhoea, 4 from cholera infantum, 70 from other diseases of the stomach and bowels, 8 from diphtheria, 5 from measles, 1 from whooping-cough, 22 from typhoid fever, 1 from malarial fevers, 13 from cerebro-spinal fever, 48 from cancer, 2 from erysipelas, 82 from diseases of the heart, 1 from alcoholism, and 423 from all other causes, 14 of which were from la grippe.

PREVAILING DISEASES.

Reports from 40 localities outside of the larger cities and towns give 39 cases of pneumonia, 122 of bronchitis, 36 of pleurisy, 17 of congestion of the lungs, 75 of diarrhoea, 13 of dysentery, 8 of cholera morbus, 4 of cholera infantum, 7 of diphtheria, 12 of croup, 7 of scarlatina, 54 of measles, 21 of whooping-cough, 467 of la grippe, 9 of typhoid fever, 147 of malarial fevers, 1 of erysipelas, 109 of rheumatism, 84 of neuralgia, 48 of tonsilitis, and 60 of pharyngitis.

Measles were epidemic at Vallejo and National City. Whooping-cough was epidemic at Pomona.

DIPHTHERIA ANTITOXINE.

A sufficient supply of antitoxine has been obtained for general use by sanitary officers and the medical profession. It is free of charge. Requisitions by letter or wire should, when from cities and towns having Health Boards, be made through a sanitary officer; but all requisitions from legal practitioners will be promptly honored, the only return being data concerning its use.

Antitoxine may be obtained by addressing Dr. W. F. Wiard, Sacramento; Dr. C. A. Ruggles, Stockton; Dr. J. H. Davison, Los Angeles; Dr. P. C. Remondino, San Diego, and Dr. Winslow Anderson, San Francisco.

A prompt acknowledgment of the receipt of the packages should be made, with such data as will show by whom and upon whom it was administered, with previous condition and result.

SMALLPOX.

Southern California has been threatened with smallpox by way of the Mexican border of Arizona. There have been a number of deaths, but the inhabitants are being vaccinated and all necessary precautions have been taken by the authorities of the General Government, the Territorial officers, and also by the California State Board of Health. Inspectors have been on duty near Yuma, on either side of the Colorado River, for ten days or more. The latest advices would indicate that a further spread of the disease will be prevented. A general vaccination and re-vaccination is in order as the only sure preventive.

REPORT OF THE STATE BOARD OF HEALTH.

Cities and Towns.	Alameda	Anaheim and vicinity	Antioch and vicinity	Arbutle	Azusa and vicinity	Berkeley	Calico and vicinity	Colton and vicinity	College City	Chico and vicinity	Davisville	Dixon and vicinity	Downeyville and vicinity	Downey and vicinity	Etna Mills	El Monte and vicinity	Eureka and vicinity	Fresno	Fresno Flats	Folsom	Gass Valley and vicinity	Gridley	Highland	Knight's Ferry	Kelseyville and vicinity	Locketford	Long Beach and vicinity	Livermore	Lakeport	Lodi and vicinity	Los Angeles	Marysville	Merced
Estimated Population	14,000	5,000	3,000	800	2,600	10,000	500	2,500	700	8,890	1,000	2,500	800	2,500	1,000	2,000	7,800	10,000	600	2,500	7,000	1,000	1,700	1,500	400	1,000	2,000	2,500	1,200	2,000	76,000	4,000	2,000
Total Deaths	14	4	3	1	2	5	0	1	1	13	0	1	1	3	2	3	17	8	0	1	3	1	0	2	0	2	1	3	1	1	119	9	6
Consumption	-	-	1	1	-	-	1	1	1	1	-	-	-	-	-	1	3	1	-	-	-	-	-	2	-	1	1	2	-	-	20	4	2
Acute Pneumonia	2	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	5	-	-	-	-	-	-	-	-	-	-	-	-	4	3	-	
Congestion of the Lungs	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	6	1	
Diarrhoea and Dysentery	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	
Cholera Infantum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	
Other Diseases of St'mach & Bow'ls	-	-	1	-	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	1	-	
Diphtheria	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	
Croup	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Scarlet Fever	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Measles	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Smallpox	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Whooping-Cough	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Typhoid Fever	1	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1	-	6	1	1	
Remittent and Intermittent Fevers	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Cerebro-Spinal Fevers	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	1	-	
Cancer	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	
Erysipelas	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	1	-	-	-	-	1	-	-	-	-	-	-	-	-	14	1	-
Heart Diseases	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	4	1	-	-	-	-	1	-	-	-	-	-	1	-	1	4	1	
Alcoholism	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Other Causes	7	2	1	-	-	-	2	2	-	-	-	-	10	-	1	1	2	2	2	1	3	4	-	-	-	1	-	1	-	-	1	67	1

MONTHLY HEALTH REPORTS.

[illegible]

MAY, 1895.

Reports from 65 cities, towns, villages, and sanitary districts, aggregating a population of 746,923, show a mortality of 884—a death-rate of 1.18 per 1,000 for May, or 14.16 per 1,000 per annum.

There were 183 deaths from consumption, 52 from pneumonia, 28 from bronchitis, 6 from congestion of the lungs, 6 from diarrhoea, 9 from cholera infantum, 56 from other diseases of the stomach and bowels, 6 from diphtheria, 3 from croup, 1 from measles, 4 from whooping-cough,

JUNE, 1895.

Reports from 60 cities, towns, villages, and sanitary districts, aggregating a population of 432,023, show a mortality of 465—a death-rate of 1.07 per 1,000 for June, or 12.84 per 1,000 per annum.

There were 104 deaths from consumption, 19 from pneumonia, 5 from bronchitis, 1 from congestion of the lungs, 5 from diarrhoea and dysentery, 18 from cholera infantum, 38 from other diseases of the stomach and bowels, 2 from diphtheria, 1 from croup, 3 from scarlatina, 1 from measles, 2 from whooping-cough, 7 from typhoid fever, 2 from malarial fevers, 3 from cerebro-spinal fever, 12 from cancer, 1 from erysipelas, 28 from diseases of the heart, 1 from alcoholism, and 212 from all other causes, 2 of which were from la grippe.

It will be noted that San Francisco, with its 330,000 population, has no report at this date for June, 1895, which in a measure alters the usual percentage of deaths, as well as making a large discrepancy in the population reported from.

PREVAILING DISEASES.

Reports from 28 localities outside of the larger cities and towns give 19 cases of pneumonia, 60 of bronchitis, 17 of pleurisy, 3 of congestion of the lungs, 75 of diarrhoea, 44 of dysentery, 20 of cholera morbus, 8 of cholera infantum, 6 of diphtheria, 4 of croup, 2 of scarlatina, 79 of measles, 57 of whooping-cough, 85 of la grippe, 26 of typhoid fever, 119 of malarial fevers, 1 of cerebro-spinal fever, 7 of erysipelas, 50 of rheumatism, 36 of neuralgia, 125 of tonsillitis, and 24 of pharyngitis.

Measles were reported epidemic at El Monte and Azusa; whooping-cough was epidemic at Fresno Flats, and mumps were reported as prevailing at Azusa.

The following chapter of the statutes enacted by the last Legislature is so important, as well as beneficent, that it is deemed best, in the interest of public health, to give it as wide publication as possible. It is not generally known that the Act included a penalty for the sale of milk from a diseased animal, but Section 3 (b), (6) explains that the sale of such milk makes the person guilty of a misdemeanor, and liable to a fine not exceeding \$100 nor less than \$25, or imprisonment in the county jail not exceeding 100 nor less than 30 days, or both.

Milk from cows afflicted with tuberculosis or any other disease comes under this statute.

CHAPTER LXXVI—AN ACT TO PROVIDE AGAINST ADULTERATION OF FOOD AND DRUGS.

(Approved March 26, 1895.)

The People of the State of California, represented in Senate and Assembly, do enact as follows:

SECTION 1. No person shall, within this State, manufacture for sale, offer for sale, or sell any drug or article of food which is adulterated within the meaning of this Act.

SEC. 2. The term "drug," as used in this Act, shall include all medicines for internal or external use, antiseptics, disinfectants, and cosmetics. The term "food," as used herein, shall include all articles used for food or drink by man, whether simple, mixed, or compound.

SEC. 3. Any article shall be deemed to be adulterated within the meaning of this Act:

(a) In the case of drugs: (1) If, when sold under or by a name recognized in the United States Pharmacopoeia, it differs from the standard of strength, quality, or purity laid down therein. (2) If, when sold under or by a name not recognized in the United States Pharmacopoeia, but which is found in some other pharmacopoeia or other standard work on materia medica, it differs materially from the standard of strength, quality, or purity laid down in such work. (3) If its strength, quality, or purity falls below the professed standard under which it is sold.

(b) In the case of food: (1) If any substance or substances have been mixed with it, so as to lower or depreciate, or injuriously affect its quality, strength, or purity. (2) If any inferior or cheaper substance or substances have been substituted wholly or in part for it. (3) If any valuable or necessary constituent or ingredient has been wholly or in part abstracted from it. (4) If it is an imitation of, or is sold under the name of, another article. (5) If it consists wholly, or in part, of a diseased, decomposed, putrid, infected, tainted, or rotten animal or vegetable substance or article, whether manufactured or not; or in the case of milk, if it is the produce of a diseased animal. (6) If it is colored, coated, polished, or

powdered, whereby damage or inferiority is concealed, or if by any means it is made to appear better or of greater value than it really is. (7) If it contains any added substance or ingredient which is poisonous or injurious to health. *Provided*, that the provisions of this Act shall not apply to mixtures or compounds recognized as ordinary articles or ingredients of food, if each and every package sold or offered for sale be distinctly labeled as mixtures or compounds, with the name and per cent of each ingredient therein, and are not injurious to health.

Sec. 4. Every person manufacturing, exposing or offering for sale, or delivering to a purchaser, any drug or article of food included in the provisions of this Act, shall furnish to any person interested, or demanding the same, who shall apply to him for the purpose, and shall tender him the value of the same, a sample sufficient for the analysis of any such drug or article of food which is in his possession.

SEC. 5. Whoever refuses to comply, upon demand, with the requirements of section four, and whoever violates any of the provisions of this Act, shall be guilty of a misdemeanor, and shall be fined not exceeding one hundred nor less than twenty-five dollars, or imprisoned in the county jail not exceeding one hundred nor less than thirty days, or both. And any person found guilty of manufacturing, offering for sale, or reselling, an adulterated article of food or drug under the provisions of this Act shall be adjudged to pay, in addition to the penalties hereinbefore provided for, all the necessary costs and expenses incurred in inspecting and analyzing such adulterated articles of which said person may have been found guilty of manufacturing, selling, or offering for sale.

SEC. 6. This Act shall be in force and take effect from and after its passage.

Abstract of the Reports of Deaths and their Causes in the following Cities and Towns during June, 1895.

Cities and Towns.	Estimated Population	Total Deaths	Consumption	Acute Pneumonia.	Acute Bronchitis.	Congestion of the Lungs	Diarrhoea and Dysentery	Cholera Infantum.	Other Diseases of St'mach & Bow'ls	Diphtheria	Croup	Scarlet Fever	Measles	Smallpox	Whooping-Cough	Typhoid Fever	Remittent and Intermittent Fevers	Cerebro-Spinal Fevers	Cancer	Erysipelas	Heart Diseases	Alcoholism	Other Causes
Alturas	1,000	1							1								1		2				1
Alameda	15,000	12	3				1		1														4
Anaheim and vicinity	5,000	0																					1
Anderson	1,000																						
Azusa and vicinity	2,600	8	3																1				
Berkeley	10,000	9	2																				
Bishop and vicinity	1,500	1																					
Calico	500	2																					
College City	2,500	2																					
Colfax	700	1					1																
Concord	1,000	2																			1		
Chico and vicinity	8,800	7		1																			
Dixon and vicinity	2,500	1																					
Downville and vicinity	800	1																					
Downey and vicinity	2,500	4	1																1				
El Monte and vicinity	2,000	5	3																				
Eureka and vicinity	8,000	9			1			1		1													
Eresno	10,000	9	1				1													1			

REPORT OF THE STATE BOARD OF HEALTH.

Cities and Towns.	Estimated Population	Total Deaths	Consumption	Acute Pneumonia.	Acute Bronchitis.	Congestion of the Lungs	Diarrhoea and Dysentery	Cholera Infantum.	Other Diseases of St'mach & Bow'ls	Diphtheria	Croup	Scarlet Fever	Measles	Smallpox	Whooping-Cough	Typhoid Fever	Remittent and Intermittent Fevers	Cerebro-Spinal Fevers	Cancer	Erysipelas	Heart Diseases	Alcoholism	Other Causes
Fresno Flats	600	1																					1
Folsom	2,500	0	2								1												2
Grass Valley and vicinity	7,000	5	1						1														1
Gridley	700	3																					1
Highland	1,700	0																					1
Lockeford	1,000	3		1				1															1
Livermore	2,500	2																					1
Lakeport	1,200	1							1														1
Lodi and vicinity	2,000	0																					1
Los Angeles	80,000	94	29	4	1		1	4	6	1		1				2					5	1	37
Marysville	4,000	4	1																				3
Merced	2,000	1										1											
Madera and vicinity	2,500	0																					3
Madera	2,600	7	2	2																			24
Napa	7,000	7																					6
Napa	7,000	7											1										1
National City	1,200	1																					4
Oakland	60,000	49	8	3	1			4	4														24
Oakland Township	10,000	11	1	1					2														6
Ontario and vicinity	3,000	3	1	1																			1
Pasadena and vicinity	12,000	15	6						3														1
Pasadena	12,000	15	6																				4
Palo Alto	1,100	2			1																		1
Palo Alto	1,100	2			1																		1
Pomona and vicinity	6,000	3			1																		1
Pleasanton	2,000	5	1					1	2														1
Pleasanton	2,000	5	1																				1
Redlands and vicinity	3,500	5	3						1														1
Redlands	3,500	5	3						5														26
Sacramento	30,000	48	8			1		2								1							2
Sacramento	30,000	48	8																				2
San Bernardino	8,500	7	3																				14
San Bernardino	8,500	7	3																				2
San Diego	16,153	17	3																				14
San Diego	16,153	17	3																				2
San Jose	25,000	22	5	3				1	1														10
San Jose	25,000	22	5	3																			6
San Luis Obispo	3,000	11	1			1			1														5
San Luis Obispo	3,000	11	1																				5
San Pablo	500	2	1																				1
San Rafael	3,800	8	3																				1
San Rafael	3,800	8	3																				1
Santa Ana and vicinity	10,000	11	2	1																			2
Santa Ana and vicinity	10,000	11	2	1																			6
Santa Barbara	5,864	10	1	2																			3
Santa Barbara	5,864	10	1	2																			3
Santa Rosa	5,216	6						1															3

1000	2																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
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JULY, 1895.

Reports from 64 cities, towns, villages, and sanitary districts, aggregating a population of 747,359, show a mortality of 977—a death-rate of 1.30 per 1,000 for July, or 15.60 per 1,000 per annum.

There were 198 deaths from consumption, 33 from pneumonia, 20 from bronchitis, 2 from congestion of the lungs, 7 from diarrhoea, 34 from cholera infantum, 63 from other diseases of the stomach and bowels, 1 from diphtheria, 4 from scarlatina, 3 from measles, 3 from whooping-cough, 29 from typhoid fever, 4 from malarial fever, 2 from cerebro-spinal fever, 38 from cancer, 1 from erysipelas, 82 from diseases of the heart, 4 from alcoholism, and 448 from all other causes, 4 of which were from la grippe and 1 from leprosy.

PREVAILING DISEASES.

Reports from 31 localities outside of the larger cities and towns give 2 cases of pneumonia, 43 of bronchitis, 7 of pleurisy, 5 of congestion of the lungs, 151 of diarrhoea, 27 of dysentery, 36 of cholera morbus, 46 of cholera infantum, 1 of diphtheria, 1 of croup, 3 of scarlatina, 15 of measles, 45 of whooping-cough, 40 of la grippe, 21 of typhoid fever, 119 of malarial fever, 7 of erysipelas, 78 of rheumatism, 35 of neuralgia, 48 of tonsillitis, 13 of pharyngitis, 10 of chicken-pox, and 1 of mumps.

Abstract of the Reports of Deaths and their Causes in the following Cities and Towns of California during July, 1895.

Cities and Towns.	Deaths.		Population.		Rate per 1,000.	
	1890.	1891.	1890.	1891.	1890.	1891.
Alameda.....	15,000	13	15,000	13	9	—
Anderson.....	1,000	0	1,000	0	—	—
Benicia and vicinity.....	3,000	2	3,000	2	—	—
Other Causes.....	—	—	—	—	—	—
Alcoholism.....	—	—	—	—	—	—
Heart Diseases.....	—	—	—	—	—	1
Erysipelas.....	—	—	—	—	—	—
Cancer.....	—	1	—	1	—	—
Cerebro-Spinal Fevers.....	—	—	—	—	—	—
Remittent and Intermittent Fevers.....	—	—	—	—	—	—
Typhoid Fever.....	—	—	—	—	—	—
Whooping-Cough.....	—	—	—	—	—	—
Smallpox.....	—	—	—	—	—	—
Measles.....	—	—	—	—	—	—
Scarlet Fever.....	—	—	—	—	—	—
Croup.....	—	—	—	—	—	—
Diphtheria.....	—	—	—	—	—	—
Other Diseases of St'mach & Bow'ls.....	1	—	—	—	—	—
Cholera Infantum.....	—	—	—	—	—	—
Diarrhoea and Dysentery.....	—	—	—	—	—	—
Congestion of the Lungs.....	—	—	—	—	—	—
Acute Bronchitis.....	—	—	—	—	—	—
Acute Pneumonia.....	—	—	—	—	—	—
Consumption.....	2	2	—	1	—	—
Total Deaths.....	13	0	—	—	—	—
Estimated Population.....	15,000	—	—	—	—	—

ABSTRACT FOR JULY, 1895—Continued.

Cities and Towns.	Estimated Population	Total Deaths	Consumption	Acute Pneumonia.	Acute Bronchitis.	Congestion of the Lungs	Diarrhoea and Dysentery	Cholera Infantum.	Other Diseases of St'mach & Bow'ls	Diphtheria	Croup	Scarlet Fever	Measles	Smallpox	Whooping-Cough	Typhoid Fever	Remittent and Intermittent Fevers	Cerebro-Spinal Fevers	Cancer	Erysipelas	Heart Diseases	Alcoholism	Other Causes
Berkeley	10,000	10	1	1	1				1								1				1		4
Bishop and vicinity	2,000	3							1														2
Calico	500	0																					1
Colton and vicinity	2,500	2	1																	1			1
Concord	500	2																					1
Chico and vicinity	8,800	3							1														2
Dixon and vicinity	2,500	2																					1
Downeyville and vicinity	800	1	1																				1
Downey and vicinity	2,500	3	1																				1
Etna Mills and vicinity	1,000	2	1																				1
El Monte and vicinity	2,000	2	2																				1
Fallbrook and vicinity	1,200	0																					1
Fallbrook Flats	600	3																					1
Fresno	10,000	11	1														1						3
Folsom	1,800	3							2								2						1
Grass Valley and vicinity	7,000	8				1														1			2
Gridley	1,000	1																					1
Highland	1,700	0																					2
Lockeford	500	2	2																				1
Lakeport	1,200	1							1														1
Lodi and vicinity	1,500	1																					1
Los Angeles	80,000	96	25	1	3			1	5			1	2				2						41
Long Beach and vicinity	3,500	6	1	1			1	1	1														4
Marysville	4,000	5	1	1													2			1			1
Mariposa	1,000	1						1															1
Madera and vicinity	2,500	5	1					1															4
Monterey	2,000	0																					2
Napa	7,000	6		1			1													1			1
National City	1,200	1	1																	1			2
Nevada City	2,736	4						2															1
Needles and vicinity	1,500	2	6	2																			1
Oakland	60,000	54	6	2					4								2						28
Ontario and vicinity	3,000	6	2						1											5			9

Pasadena and vicinity	9,500	16	4	--	--	--	--	--	3	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Pala Alto	1,000	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Pomona and vicinity	6,000	7	1	--	--	--	--	1	--	--	--	--	--	--	--	--	--	1	--	--	--	--	--
Pleasanton	2,000	1	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Redlands and vicinity	3,500	4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Rio Vista and vicinity	2,000	7	--	--	--	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--	--	--	--
Selma and vicinity	5,000	4	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sacramento	30,000	40	7	--	--	1	--	2	1	--	--	--	--	--	--	--	--	--	4	--	--	--	--
San Bernardino	8,500	4	2	--	--	1	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
San Diego	16,153	12	2	--	--	--	--	--	1	--	--	--	--	--	--	--	--	1	--	--	--	--	--
San Francisco	390,000	539	117	22	16	4	19	30	--	3	--	--	--	--	--	--	--	1	15	1	1	43	3
San José	25,000	22	7	--	--	1	1	1	--	--	--	--	--	--	--	--	--	--	1	2	--	--	--
San Luis Obispo	4,000	9	--	1	--	--	--	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--
San Pedro	1,240	3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
San Rafael	3,800	3	1	--	--	--	--	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Santa Ana and vicinity	10,000	7	1	--	--	--	--	3	--	--	--	--	--	--	--	--	--	1	--	--	--	--	--
Santa Barbara	5,864	7	2	1	--	--	--	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Santa Rosa	5,216	6	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Santa Paula and vicinity	2,000	2	1	--	--	--	--	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Santa Maria	1,000	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sausalito	1,000	3	--	--	--	--	--	--	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--
Sierra Valley	1,000	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Stockton	17,000	15	5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
St. Helena and vicinity	2,500	3	--	--	--	--	--	1	--	--	--	--	--	--	--	--	--	--	1	--	--	--	--
Truckee and vicinity	1,300	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tulare City	4,000	2	--	--	--	--	--	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Upper Lake	300	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Watsonville and vicinity	3,000	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Totals	747,359	977	198	33	20	2	7	34	63	1	4	1	3	0	3	29	4	2	38	1	82	4	448

AUGUST, 1895.

Reports from 64 cities, towns, villages, and sanitary districts, aggregating a population of 778,017, show a mortality of 858—a death-rate of 1.10 per 1,000 for August, or 13.20 per 1,000 per annum.

There were 138 deaths from consumption, 30 from pneumonia, 16 from bronchitis, 7 from congestion of the lungs, 10 from diarrhoea, 23 from cholera infantum, 70 from other diseases of the stomach and bowels, 5 from diphtheria, 2 from croup, 2 from whooping-cough, 21 from typhoid fever, 7 from malarial fevers, 8 from cerebro-spinal fever, 31 from cancer, 2 from erysipelas, 70 from diseases of the heart, 2 from alcoholism, and 414 from all other causes.

PREVAILING DISEASES.

Reports from 32 localities, outside of the larger cities and towns, give 10 cases of pneumonia, 53 of pleurisy, 2 of congestion of the lungs, 164 of diarrhoea, 25 of dysentery, 30 of cholera morbus, 39 of cholera infantum, 6 of diphtheria, 6 of croup, 1 of measles, 32 of whooping-

cough, 44 of la grippe, 34 of typhoid fever, 150 of malarial fever, 1 of cerebro-spinal fever, 7 of erysipelas, 82 of rheumatism, 41 neuralgia, 45 of tonsillitis, 37 of pharyngitis.

Chicken-pox was reported epidemic at Folsom.

THE APPROACH OF ASIATIC CHOLERA.

On account of reports of cholera in China, Japan, and the Hawaiian Islands, the State Board deemed it advisable, at a special meeting held at San Francisco, September 3d, to ask the General Government to declare a quarantine against all infected foreign ports, and enforce the quarantine laws, rules, and regulations of the United States against them. Such a request did not contemplate an interference with, or an infringement on, the duties of local or municipal health and quarantine officials. The Secretary of the Treasury issues orders to United States Consular officers, and to medical officers serving at foreign ports, making publicly known the rules and regulations made by him, to be used and complied with by vessels in foreign ports for securing the best sanitary condition of such vessels, their cargoes, and passengers, and crew, before their departure for any port in the United States, and in the course of the voyage; and all such other rules and regulations as shall be observed in the inspection of the same on the arrival thereof at any quarantine station at the port of destination, and for the disinfection and isolation of the same, and the treatment of cargo and persons on board, so as to prevent the introduction of cholera, yellow fever, or other contagious and infectious diseases.

The above is recited merely to show that the authority of the Government is extended far beyond the jurisdiction of a municipal quarantine, which cannot decree nor enforce rules and regulations in foreign ports, nor on board a vessel on its voyage.

The enforcement of regulations at the port of departure is regarded as more important, if anything, than the matter of quarantine at the port of destination, for if no contagious disease germs get aboard, there will be no quarantine to undergo when the vessel reaches port. While on this subject, it is interesting to note that the most advanced sanitary authorities in the United States lean in favor of governmental control of all international quarantine.

The *Texas Sanitarian*, in a recent number, makes an unanswerable argument in its favor. Michigan, Virginia, Tennessee, California, Ohio, and a number of other States have, through their officials, at various times, expressed views in favor of governmental control. It would seem to be the ideal quarantine, and would relieve States and municipalities of an enormous expense.

But there will be no clashing of authority in the event of cholera knocking at our doors. There will be harmonious action and a determination to prevent its entrance.

It is a good time for local boards to clean house by the removal of all unsanitary conditions in towns and villages, no matter how remote.

The following telegram was recently received from Washington:

"September 4, 1895.

J. R. LATANE, M.D., *Secretary State Board of Health*, Sacramento, Cal.:

"Your telegram has been received. All ports on the Pacific Coast have been inspected by Marine Hospital officers this summer, and steps taken to perfect every quarantine deficiency.

"Consular reports from Honolulu verified presence of cholera; also, at Yokohama.

"All the information is in the weekly abstract sanitary reports, which all quarantine officers receive.

"Strict compliance with Treasury regulations will be insisted on both at foreign and domestic ports.

"WALTER H. WYMAN,

"Surgeon-General Marine Hospital Service."

It is found necessary to continue an inspector against smallpox near the Arizona border. It is propagated principally among Mexican inhabitants, near the Mexican border, and has prevailed all summer. It will require general vaccination to place our people in a condition of safety before the coming winter. An epidemic of smallpox is an expensive luxury, and no effort should be spared to evade it. Vaccination is surer than inspection and quarantine.

REPORT OF THE STATE BOARD OF HEALTH.

Cities and Towns.	Estimated Population	Total Deaths	Consumption	Acute Pneumonia.	Acute Bronchitis..	Congestion of the Lungs	Diarrhoea and Dysentery	Cholera Infantum.	Other Diseases of St'mach & Bow'ls	Diphtheria	Croup	Scarlet Fever	Measles	Smallpox	Whooping-Cough	Typhoid Fever	Remittent and Intermittent Fevers	Cerebro-Spinal Fevers	Cancer	Erysipelas.	Heart Diseases	Alcoholism	Other Causes
Nevada City	2,736	0	5	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2
Needles and vicinity	1,600	46	2	1	1	1	1	1	4	1	1	1	1	1	1	1	5	1	1	1	1	1	27
Oakland	60,000	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2
Oroville	2,000	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	7
Ontario and vicinity	3,000	10,000	12	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Pasadena and vicinity	10,000	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	7
Pleasanton	2,000	6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Red Bluff and vicinity	10,000	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Redlands and vicinity	3,500	2,000	1	1	1	1	1	2	4	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Rio Vista and vicinity	2,000	30,000	44	12	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Sacramento	8,600	7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
San Bernardino	16,153	11	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
San Diego	330,000	438	65	21	11	5	5	12	35	1	1	1	1	1	1	1	5	2	1	21	2	43	2
San Francisco	25,000	24	4	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	7
San José	4,000	6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	205
San Luis Obispo	3,800	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	4
San Rafael	10,000	12	2	1	1	1	1	1	2	1	1	1	1	1	1	2	1	1	1	1	1	1	2
Santa Ana and vicinity	6,864	8	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2
Santa Barbara	3,000	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	4
Santa Clara	6,594	4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2
Santa Cruz	1,000	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2
Santa Maria	3,000	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Selma and vicinity	1,000	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Sisson	17,000	21	4	1	1	1	1	1	4	1	1	1	1	1	1	1	1	1	2	1	1	1	1
Stockton	2,500	4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	8
St. Helena and vicinity	1,300	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2
Truckee and vicinity	2,000	5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	4
Tulare City	7,000	4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3
Vallejo	3,000	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Watsonville and vicinity	800	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Williams	778,017	858	138	30	16	7	10	23	70	5	2	0	0	0	2	21	7	8	31	2	70	2	414
Totals																							

REPORT OF THE STATE BOARD OF HEALTH.

[illegible]

REPORT OF THE STATE BOARD OF HEALTH.

Other Causes.....	3	3	2	3	2	4	9	1	1	4	2	3	1	82	4
Alcoholism.....								1							
Heart Diseases...	1				1	1				6	3		2		
Erysipelas.....															
Cancer.....	2					1					1		6	1	1
Cerebro-Spinal Fevers.....	1									1	2			1	
Remittent and Intermittent Fevers.....							2			1					1
Typhoid Fever.....										2		1		1	
Whooping-Cough.....															
Smallpox.....															
Measles.....															
Scarlet Fever.....						1									
Croup.....															
Diphtheria.....							1								
Other Diseases of St'mach & Bow'ls.....	1					2	1								
Cholera Infantum.....					1										
Diarrhoea and Dysentery.....	1						1								
Congestion of the Lungs.....															
Acute Bronchitis.....					1										
Acute Pneumonia.....	1							1					6	1	
Consumption.....	1				1	2									
Total Deaths.....	11	0	2	0	2	7	0	13	2	84	6	2	64	1	1
Estimated Population.....	15,000	500	2,600	10,000	500	2,500	700	8,800	2,500	2,500	1,000	2,000	1,200	80,000	4,000
Alameda.....	15,000														
Arbuckle.....	500														
Azusa and vicinity.....	2,600														
Berkeley.....	10,000														
Calico.....	500														
Colton and vicinity.....	2,500														
College City.....	700														
Concord.....	700														
Chico and vicinity.....	8,800														
Dixon and vicinity.....	2,500														
Downville and vicinity.....	800														
El Monte and vicinity.....	2,500														
Eureka.....	8,000														
Fresno.....	10,000														
Folsom.....	2,500														
Grass Valley.....	7,000														
Gridley.....	1,000														
Lockeford.....	1,000														
Long Beach and vicinity.....	2,000														
Lakeport.....	1,200														
Los Angeles.....	80,000														
Marysville.....	4,000														
Merced.....	2,000														
Monterey.....	3,000														
Napa and vicinity.....	7,000														
National City.....	1,200														
Nevada City.....	3,000														
Needles and vicinity.....	1,500														
Oakland.....	60,000														
Oroville.....	2,000														
Ontario and vicinity.....	3,000														
Pasadena and vicinity.....	9,500														
Pleasanton.....	2,000														

Cities and Towns.

Pleasanton	2,000	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--	--	--	1
Red Bluff and vicinity	5,000	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--	--	--	1
Redlands and vicinity	4,000	10	4	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	6
Rio Vista and vicinity	2,000	5	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--	--	2
Sacramento	30,000	36	5	3	--	1	--	--	5	--	--	2	--	--	--	--	--	--	--	--	--	--	--	15
San Bernardino	8,600	14	3	4	1	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--	--	5
San Diego	20,000	19	5	1	1	2	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--	--	7
San Francisco	330,000	514	76	48	19	2	3	3	33	2	4	--	1	9	--	1	25	1	65	1	8	2	220	
San José	25,000	26	4	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	16
San Luis Obispo	4,000	11	--	1	--	--	--	--	1	--	--	2	--	--	--	--	--	--	--	--	--	--	--	5
San Rafael	3,800	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1
Santa Ana and vicinity	10,000	14	2	1	--	--	--	1	2	--	--	1	--	--	--	--	--	--	1	--	--	--	--	6
Santa Barbara	5,864	13	3	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--	--	3
Santa Rosa	5,216	7	2	--	--	--	1	--	1	--	--	--	--	--	--	--	--	--	1	--	--	--	--	3
Santa Paula and vicinity	2,000	3	1	1	--	--	--	--	--	1	--	--	--	--	--	--	--	--	1	--	--	--	--	1
Santa Maria	1,000	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1
Selma and vicinity	3,000	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1
Stockton	17,000	16	2	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--	--	11
St. Helena and vicinity	2,500	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1
Truckee and vicinity	1,300	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--	--	1
Tulare City	2,000	3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--	--	1
Upper Lake	300	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1
Vallejo	7,000	7	1	--	--	--	--	--	1	--	--	--	--	--	--	--	--	--	1	--	--	--	--	2
Watsonville and vicinity	3,000	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--	--	1
Totals	773,370	1,031	185	85	25	9	6	8	68	9	9	0	0	0	3	20	6	3	42	4	116	4	429	

JANUARY, 1896.

Reports from 52 cities, towns, villages, and sanitary districts, aggregating a population of 716,806, show a mortality of 953—a death-rate of 1.32 per 1,000 for January, 1896, or 15.94 per 1,000 per annum.

There were 183 deaths from consumption, 99 from pneumonia, 34 from bronchitis, 18 from congestion of the lungs, 4 from diarrhoea and dysentery, 3 from cholera infantum, 56 from other diseases of the stomach and bowels, 8 from diphtheria, 5 from croup, 2 from scarlatina, 4 from measles, 3 from whooping-cough, 19 from typhoid fever, 4 from malarial fevers, 5 from cerebro-spinal fever, 35 from cancer, 2 from erysipelas, 108 from diseases of the heart, 5 from alcoholism, and 357 from all other causes, 2 of which were from la grippe.

PREVAILING DISEASES.

Reports from 30 localities outside of the larger cities and towns give 62 cases of pneumonia, 107 of bronchitis, 22 of pleurisy, 17 of congestion of the lungs, 30 of diarrhoea, 7 of dysentery, 6 of cholera morbus, 3 of cholera infantum, 14 of diphtheria, 11 of croup, 6 of scarlatina, 29 of measles, 9 of whooping-cough, 144 of la grippe, 11 of typhoid fever, 83 of malarial fevers, 1 of cerebro-spinal fever, 13 of erysipelas, 78 of rheumatism, 77 of neuralgia, 84 of tonsillitis, 43 of pharyngitis.

Whooping-cough was reported epidemic at Orange Vale, and chicken-pox was reported epidemic at Los Angeles.

MONTHLY HEALTH REPORTS.

Gridley	1,500	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
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FEBRUARY, 1896.

Reports from 49 cities, towns, villages, and sanitary districts, aggregating a population of 722,470, show a mortality of 910—a death-rate of 1.25 per thousand for February, or 15.00 per thousand per annum.

There were 194 deaths from consumption, 69 from pneumonia, 22 from bronchitis, 8 from congestion of the lungs, 3 from dysentery, 3 from cholera infantum, 52 from other diseases of the stomach and bowels, 9 from diphtheria, 5 from croup, 2 from scarlatina, 1 from measles, 1 from whooping-cough, 14 from typhoid fever, 2 from malarial fevers, 4 from cerebro-spinal fever, 37 from cancer, 3 from erysipelas, 87 from diseases of the heart, 5 from alcoholism, and 389 from all other causes, 6 of which were from la grippe.

PREVAILING DISEASES.

Reports from 27 localities outside of the larger cities and towns give 48 cases of pneumonia, 99 of bronchitis, 40 of pleurisy, 26 of congestion of the lungs, 10 of diarrhoea, 1 of dysentery, 4 of cholera infantum, 3 of cholera morbus, 19 of diphtheria, 10 of croup, 7 of scarlatina, 28 of measles, 11 of whooping-cough, 148 of la grippe, 7 of typhoid fever, 76 of malarial fevers, 3 of cerebro-spinal fever, 11 of erysipelas, 85 of rheumatism, 81 of neuralgia, 131 of tonsilitis, and 66 of pharyngitis.

Measles were reported epidemic at Calico and Pasadena.

SMALLPOX.

There has been no increase in smallpox in Southern California, and it may be regarded as stamped out. One case was reported from Napa County, about five miles south of Napa City. Due precautions, such as isolation and vaccination, were the means adopted to limit its spread.

FOURTH ANNUAL SANITARY CONVENTION.

The fourth annual Sanitary Convention will be held at Los Angeles at 1 p. m. on April 20, 1896, under the auspices of the State Board of Health. Short papers on sanitary subjects are desired. There will be an afternoon and an evening session, and the transactions will be printed. All persons, in and out of the medical profession, who take an interest in public health matters, are invited to take part. The interest manifested in what California has done in this direction up to the present time justifies an increased confidence in the value of these conventions.

Abstract of the Reports of Deaths and their Causes in the following Cities and Towns of California during February, 1896.

[illegible]

MONTHLY HEALTH REPORTS.

[illegible]

MONTHLY HEALTH REPORTS.

[illegible]

ABSTRACT FOR MARCH, 1896—Continued.

Cities and Towns.	Estimated Population	Total Deaths	Consumption	Acute Pneumonia.	Acute Bronchitis.	Congestion of the Lungs	Diarrhoea and Dysentery	Cholera Infantum.	Other Diseases of St'mach & Bow'ls	Diphtheria	Croup	Scarlet Fever	Measles	Smallpox	Whooping-Cough	Typhoid Fever	Remittent and Intermittent Fevers	Cerebro-Spinal Fevers	Cancer	Erysipelas	Heart Diseases	Alcoholism	Other Causes
St. Helena and vicinity	2,500	3	1	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	3
Truckee and vicinity	1,300	5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—
Tulare City	2,000	1	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	1	—	—
Upper Lake	225	2	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Vallejo	7,000	6	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Watsonville and vicinity	3,000	3	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Wheatland	600	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Williams	500	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Totals	742,985	1,069	204	85	42	1	3	3	45	9	2	2	1	0	0	11	0	4	48	2	108	1	498

APRIL, 1896.

Reports from 67 cities, towns, villages, and sanitary districts, aggregating a population of 721,804, show a mortality of 991—a death-rate of 1.37 per 1,000 for April, or 16.44 per 1,000 per annum.

There were 183 deaths from consumption, 75 from pneumonia, 27 from bronchitis, 7 from congestion of the lungs, 1 from diarrhoea, 8 from cholera infantum, 69 from other diseases of the stomach and bowels, 5 from diphtheria, 3 from croup, 1 from scarlatina, 4 from measles, 2 from whooping-cough, 17 from typhoid fever, 4 from malarial fevers, 5 from cerebro-spinal fever, 45 from cancer, 4 from erysipelas, 103 from diseases of the heart, 6 from alcoholism, 427 from other causes, 5 of which were from la grippe and 1 from leprosy.

PREVAILING DISEASES.

Reports of prevailing diseases from 35 localities outside of the larger cities and towns give 44 cases of pneumonia, 109 of bronchitis, 15 of pleurisy, 15 of congestion of the lungs, 32 of diarrhoea, 20 of dysentery, 3 of cholera morbus, 2 of cholera infantum, 3 of diphtheria, 4 of croup, 10 of scarlatina, 101 of measles, 1 of smallpox, 22 of whooping-cough, 198 of la grippe, 12 of typhoid fever, 96 of malarial fevers, 18 of erysipelas, 106 of rheumatism, 50 of neuralgia, 114 of tonsillitis, and 42 of pharyngitis.

Measles were reported epidemic at Cottonwood, Colton, Red Bluff, and Redlands. Whooping-cough was reported epidemic at Knight's Ferry, and one case of smallpox was reported at the Napa County infirmary. Mumps were epidemic at Williams.

ABSTRACT FOR APRIL, 1896—Continued.

Cities and Towns.	Estimated Population	Other Causes.....																Totals
		1	1	13	5	10	214	15	6	3	3	2	1	1	3	1	1	
Red Bluff and vicinity	5,000	1	1	13	5	10	214	15	6	3	3	2	1	1	3	1	1	427
Redlands and vicinity	4,300	1	1	13	5	10	214	15	6	3	3	2	1	1	3	1	1	6
Rio Vista and vicinity	2,000	1	1	13	5	10	214	15	6	3	3	2	1	1	3	1	1	6
Sacramento	30,000	1	1	13	5	10	214	15	6	3	3	2	1	1	3	1	1	6
San Bernardino	9,000	1	1	13	5	10	214	15	6	3	3	2	1	1	3	1	1	6
San Diego	20,000	1	1	13	5	10	214	15	6	3	3	2	1	1	3	1	1	6
San Francisco	330,000	1	1	13	5	10	214	15	6	3	3	2	1	1	3	1	1	6
San José	25,000	1	1	13	5	10	214	15	6	3	3	2	1	1	3	1	1	6
San Luis Obispo	4,000	1	1	13	5	10	214	15	6	3	3	2	1	1	3	1	1	6
San Mateo	2,000	1	1	13	5	10	214	15	6	3	3	2	1	1	3	1	1	6
Santa Ana and vicinity	10,000	1	1	13	5	10	214	15	6	3	3	2	1	1	3	1	1	6
Santa Barbara	5,864	1	1	13	5	10	214	15	6	3	3	2	1	1	3	1	1	6
Santa Monica	6,000	1	1	13	5	10	214	15	6	3	3	2	1	1	3	1	1	6
Santa Maria	1,200	1	1	13	5	10	214	15	6	3	3	2	1	1	3	1	1	6
Selma and vicinity	3,000	1	1	13	5	10	214	15	6	3	3	2	1	1	3	1	1	6
Sierra Valley	1,000	1	1	13	5	10	214	15	6	3	3	2	1	1	3	1	1	6
St. Helena and vicinity	2,500	1	1	13	5	10	214	15	6	3	3	2	1	1	3	1	1	6
Tehama	500	1	1	13	5	10	214	15	6	3	3	2	1	1	3	1	1	6
Tulare City	2,000	1	1	13	5	10	214	15	6	3	3	2	1	1	3	1	1	6
Upper Lake	300	1	1	13	5	10	214	15	6	3	3	2	1	1	3	1	1	6
Vallejo	7,000	1	1	13	5	10	214	15	6	3	3	2	1	1	3	1	1	6
Veterans' Home, Yountville	680	1	1	13	5	10	214	15	6	3	3	2	1	1	3	1	1	6
Watsonville and vicinity	3,000	1	1	13	5	10	214	15	6	3	3	2	1	1	3	1	1	6
Williams	500	1	1	13	5	10	214	15	6	3	3	2	1	1	3	1	1	6
Totals	721,804	991	183	75	27	7	1	3	69	5	3	1	4	0	2	17	4	427

MAY, 1896.

Reports from 58 cities, towns, villages, and sanitary districts, aggregating a population of 737,270, show a mortality of 886—a death-rate of 1.33 per 1,000 for May, or 15.98 per 1,000 per annum.

There were 160 deaths from consumption, 81 from pneumonia, 83 from bronchitis, 8 from congestion of the lungs, 1 from diarrhoea, 9 from

cholera infantum 81 from other diseases of the stomach and bowels, 6 from diphtheria, 6 from croup, 1 from measles, 3 from whooping-cough, 12 from typhoid fever, 5 from malarial fevers, 11 from cerebro-spinal fever, 42 from cancer, 82 from diseases of the heart, 4 from alcoholism, and 431 from all other causes, 8 of which were from la grippe.

PREVAILING DISEASES.

Reports from 41 localities outside of the larger cities and towns give 68 cases of pneumonia, 112 of bronchitis, 14 of pleurisy, 27 of congestion of the lungs, 51 of diarrhoea, 28 of dysentery, 19 of cholera morbus, 8 of cholera infantum, 4 of diphtheria, 9 of croup, 49 of scarlatina, 190 of measles, 84 of whooping-cough, 178 of la grippe, 26 of typhoid fever, 144 of malarial fever, 4 of cerebro-spinal fever, 18 of erysipelas, 97 of rheumatism, 69 of neurælia, 87 of tonsillitis, and 43 of pharyngitis.

Measles were reported epidemic at Redlands and Red Bluff. Whooping-cough was reported epidemic at Forest Hill, Rio Vista, Redlands, and Cedarville, and mumps at Knight's Ferry and Watsonville.

Abstract of the Reports of Deaths and their Causes in the following Cities and Towns of California during May, 1896.

[illegible]

ABSTRACT FOR MAY, 1898--Continued.

Cities and Towns.	Estimated Population	Total Deaths	Consumption	Acute Pneumonia	Acute Bronchitis	Congestion of the Lungs	Diarrhoea and Dysentery	Cholera Infantum.	Other Diseases of St'mach & Bow'ls	Diphtheria	Croup	Scarlet Fever	Measles	Smallpox	Whooping-Cough	Typhoid Fever	Remittent and Intermittent Fevers	Erysipelas	Heart Diseases	Alcoholism	Other Causes
Knights Ferry	1,500	0																			1
Lockeford	1,000	1																			2
Long Beach and vicinity	2,000	1																			
Lathrop	1,000	2																			
Lodi and vicinity	1,500			1																	
Los Angeles	100,000	128	24	11	3			3	16										12	1	64
Marysville	4,000	10	1	1	1			2													3
Mariposa	1,000	1																	1		
Madera and vicinity	5,000	11																			11
Madera	60,000	59	8	4					5										9	1	30
Oakland	60,000	2																			2
Oroville	2,000	2																	1		1
Ontario and vicinity	3,500	3	1																		2
Pasadena and vicinity	9,000	0																			1
Pleasanton	1,000	2	1	1																	
Red Bluff and vicinity	5,000	5	1																		
Redding and vicinity	2,500	3																			
Redlands and vicinity	4,000	8	1							1									3		1
Rio Vista and vicinity	2,000	2																			2
Sacramento	30,000	35	4	3				1	4										2		14
San Bernardino	9,000	10	1	1															1		5
San Diego	20,000	22	7					1	1										1		11
San Francisco	330,000	538	85	48	25			1	3	5	4								48	2	228
San Jose	25,000	25	3	4	3			3											6		10
San Jose	25,000	25	3	4	3			3											1		4
San Luis Obispo	4,000	6	1																1		1
San Mateo	2,000	1																			1
Santa Ana and vicinity	10,000	20	3	2				1											1		7
Santa Barbara	5,864	9	5					1													2
Santa Rosa	6,216	0																			2
Santa Maria	1,200	3	1																		1
Selma and vicinity	3,000	1																			1
St. Helena and vicinity	2,500	4	1	1																	2
Tehama	500	0																			
Truckee and vicinity	1,500	1																			

Tulare City	2,000	8	5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
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JUNE, 1896.

Reports from 57 cities, towns, villages, and sanitary districts, aggregating a population of 734,314, show a mortality of 938—a death-rate of 1.27 per 1,000 for June, 1898, or 15.24 per 1,000 per annum.

There were 134 deaths from consumption, 79 from pneumonia, 26 from bronchitis, 6 from diarrhoea, 6 from congestion of the lungs, 14 from cholera infantum, 71 from other diseases of the stomach and bowels, 2 from diphtheria, 5 from scarlatina, 2 from measles, 6 from whooping-cough, 20 from typhoid fever, 1 from malarial fever, 6 from cerebro-spinal fever, 39 from cancer, 3 from erysipelas, 95 from diseases of the heart, 8 from alcoholism, and 413 from all other causes, 2 of which were from la grippe.

PREVAILING DISEASES.

Reports from 35 localities outside of the larger cities and towns give 19 cases of pneumonia, 55 of bronchitis, 10 of pleurisy, 7 of congestion of the lungs, 150 of diarrhoea, 36 of dysentery, 34 of cholera morbus, 19 of cholera infantum, 2 of diphtheria, 12 of croup, 13 of scarlatina, 41 of measles, 101 of whooping-cough, 88 of la grippe, 16 of typhoid fever, 123 of malarial fevers, 3 of cerebro-spinal fever, 8 of erysipelas, 88 of rheumatism, 59 of neuralgia, 51 of tonsillitis, and 23 of pharyngitis.

Whooping-cough was reported epidemic at Santa Clara, Knight's Ferry, Pleasanton, and Forest Hill. Mumps were reported epidemic at Knight's Ferry and Williams, and chicken-pox at Madera.

Abstract of the Reports of Deaths and their Causes in the following Cities and Towns of California during June, 1896.

Cities and Towns.	Total Deaths	Estimated Population
Alameda	13	15,250
Alleghany	0	700
Azusa and vicinity	5	2,600
Berkeley	15	11,200
Bishop and vicinity	1	1,500
Calico	0	500
Other Causes.....	6	
Alcoholism	-	
Heart Diseases	3	
Erysipelas.....	1	
Cancer	1	
Cerebro - Spinal Fevers.....	-	
Remittent and Intermittent Fever.....	-	
Typhoid Fever	-	
Whooping-Cough	-	
Smallpox.....	-	
Measles.....	-	
Scarlet Fever.....	-	
Croup	-	
Diphtheria	-	
Other Diseases of St'mach & Bow'ls.....	-	
Cholera Infantum.....	-	
Diarrhoea and Dysentery.....	-	
Congestion of the Lungs.....	-	
Acute Bronchitis..	-	
Acute Pneumonia.....	2	
Consumption	-	

San Diego	20,000	17	3	2	20	3	1	29	9	1	1	1	5	10	2	28	2	60	1	10			
San Francisco	330,000	500	66	49	1	2	1	1	1	1	1	1	1	1	2	1	2	2	2	209			
San José	25,000	28	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18			
San Luis Obispo	4,000	6	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2			
San Mateo	2,000	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
San Rafael	3,800	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
Santa Ana and vicinity	10,000	17	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	8			
Santa Barbara	5,864	10	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2			
Santa Clara	3,000	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
Santa Maria	1,000	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
Selma and vicinity	3,000	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
St. Helena and vicinity	2,500	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
Tehama	850	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
Truckee and vicinity	1,300	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
Tulare City	2,000	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
Upper Lake	300	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
Watsonville and vicinity	3,000	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
Williams	500	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
Totals	734,314	938	134	79	26	6	6	14	71	2	5	3	2	0	5	20	1	6	39	3	86	8	413

SANITARY INSPECTIONS BY C. A. RUGGLES, M.D.

INSPECTION OF THE FOUNDLINGS' HOME, AT SACRAMENTO.

To his Excellency JAMES H. BUDD, Governor: '

SIR: In accordance with a request made to me December 9, 1895, by your Honorable State Board of Examiners, that I make a sanitary inspection and examination of the Foundlings' Home at Sacramento, I would say that I have attended to the duties assigned to me, and most respectfully report that I notified, personally, Dr. Waggoner to furnish me with a detailed statement of the charges and allegations in relation to the institution aforesaid, which he promptly did, and a certified copy of the same was immediately furnished to the managers of the Home. All parties were notified as to the time and place of holding the investigation—Tuesday, December 17th, was the time, and, by the courtesy of Secretary of State Brown, the Supreme Court room was assigned as the place of hearing and investigating said charges.

Governor Budd had detailed a stenographer, and many daily papers were represented by their reporters. All parties assembled were notified that a full, fair, thorough, and impartial hearing would be made, with no haste, and, as far as possible, according to judicial rules.

The presentation of the charges was conducted by Dr. Waggoner; the refutation by Judge Holl.

Before entering upon our assigned duties, I was notified that two of the allegations (viz.: that persons wishing to adopt children were refused, unless a stated amount was paid; also, that State aid had been obtained for absent children) were withdrawn. It was arranged that these allegations should be taken up and considered seriatim, and they will now be reported upon in the same order.

The first article was as to the uncleanness of the institution. The evidence was very positive and conclusive that previous to about the 1st of October the institution was not in the neat and cleanly condition it should have been—the walls were smoked, the paint dirty, the bedsteads were many of them wood and infected with bedbugs. It is in evidence that at that time, to the credit of the managers it can be said, a special meeting was called and measures ordered taken to have this sad condition of things relieved—all of this previous to the inspection visit per order of the local Board of Health. Since that time the renovating process has been going on as rapidly and as thoroughly as the financial condition of the institution will permit. From personal observation I am able to say that the walls are newly and neatly kalsomined, the paint renewed, and varnish applied wherever necessary. The modern bedsteads, which had been kindly and with mistaken charity bestowed, had been condemned and consigned to the flames, and new iron bedsteads supplied in their places. It is satisfactorily shown that the present condition is what is desired, though it must be admitted that the condition previous to the date mentioned was very reprehensible.

The allegation as to the underfed condition of the inmates was next taken up and fully considered. Much emphatic testimony was presented as to the amount and character of the food furnished. But the great preponderance of evidence of Lady Managers, Matron, and the cook, whose boy was one of the unfortunate starved ones, the presentation of bills for supplies, supplemented by my own personal examination of the children, compel me to say the allegation is not sustained.

The next in order of consideration was the allegation of very great mortality in the institution. The computation from the identified records of the institution shows me that the mortality was fifty-three per cent of admissions. At the first glance this appears to be very large, and justifies a presentation of the allegation, but when it is considered that the great majority of the unfortunates are of a degraded, dissipated, and diseased origin, it does not seem so strange. Also, it is to be considered that over sixty per cent of all hand-fed babies die before arriving at the age of five years; that nearly ninety per cent of all the babies in cities and towns under one year of age, who are fed on artificial nutriments, die; also, that sanitary statistics and foundling hospital reports, both foreign and domestic, show a much larger per cent of mortality than does this institution. I am surprised that it has done as well as it has. By comparison with those of Russia, Italy, and France, its per cent of mortality is much less.

Very strong inferential evidence was produced to sustain the allegation as to the immorality among the inmates. These charges are of a very serious nature, and, if sustained, should receive very severe condemnation. The evidence is somewhat conflicting, but enough is shown to place some of the inmates in a very compromising situation. There seems to be a very peculiar condition attached to this institution: It is nominally a foundlings' home, yet really an orphan asylum, with inmates of all ages up to thirteen. If it be really a home for foundlings, my opinion is that no children over the age of five or six years should be admitted, and that those already here over that age should be transferred to the regularly organized orphan asylum. Or, if this plan of organization is to be continued, then a system of most rigid discipline should be immediately adopted, so that a complete, perfect, and positive separation of sexes should be maintained and no possibility of a recurrence of what is the foundation of this allegation.

Respectfully submitted.

CHAS. A. RUGGLES, M.D.

STOCKTON, August 20, 1896.

INSPECTION OF GOOD TEMPLARS' HOME, AT VALLEJO.

To his Excellency JAMES H. BUDD, Governor:

RESPECTED SIR: The reception of your communication, dated March 31st, in relation to the sanitary inspection of the Good Templars' Home at Vallejo, containing an anonymous statement as to its condition, is duly acknowledged. With a high appreciation of the honor conferred by my selection for said duty, I now most respectfully report that, on April 3d, I, unheralded and unannounced, visited the institution, and at a very opportune time, as there was a special session of the managers. Upon my explaining the nature of my mission and showing my

authority, I was gladly and courteously received, and every facility was offered to accomplish my purpose. A very strong and earnest desire was evinced that the examination should be as thorough and complete as possible. Judge Thompson, one of the Board, was selected to escort me around the building and premises. We examined every part and portion, from basement to attic inclusive, as to its sanitary condition.

I particularly confined my attention to a critical examination as to food, clothing, and bedding of inmates, to ventilation, water-supply, and sewerage. The food was first class in every respect, and, as I saw the entire household at dinner and examined carefully what they ate, I can say it was amply sufficient. An examination into the condition of bedsteads and bedding convinced me that there were too many wooden bedsteads—those prolific harborers of bedbugs—and I emphatically condemned their further use, especially as the iron frame can be so cheaply constructed at Folsom. The managers said the iron was being substituted as fast as possible. The ventilation is very good—no unpleasant odors or exhalations, such as are too often found in public institutions when imperfectly ventilated, were discovered. The supply of water is ample, and the quality very good.

A very careful examination was made into the condition of the water-closets and lavatories generally. Some of the water-closets are of modern style and pattern, with perfectly working flush-tanks; the others are supplied with automatic flushings, which, with an abundant supply of disinfectants, keep them in a good sanitary condition. The bathing facilities, both as to water-supply and number of tubs, are amply sufficient.

The sewage of this establishment must necessarily be large, and requires great attention as to its disposal. It is collected and conveyed in iron pipes, perfectly jointed, over four thousand feet from the building to tidewater. The plumbing is good, and all danger arising from the presence of deleterious gases is avoided.

There are, at present, in the institution 203 inmates—134 boys and 69 girls. I made a personal examination into the condition of bodily health, and, when we consider the probable parentage of these children, with a knowledge of the capable transmission of disease from sire to scion, I must say I was surprised to see a collection of children so free from hereditary taint. There is not a single case of tuberculosis in the house. There is one case of epilepsy that surreptitiously gained admission. I advised the managers to secure its removal to Glen Ellen.

The statement that the institution is filled with malignant and communicable diseases can be best contradicted by the fact that in twenty-eight months there has been only one death, and at the present time the infirmary contains only one patient.

The medical interests of the institution are presided over by Dr. Carpenter, a medical gentleman of high repute, an enthusiastic sanitarian, at present Health Officer of Vallejo. He is assisted in the infirmary by Mrs. Blume, whom I have known for many years as a lady whose ability as a nurse and a careful dispenser of medicine cannot be questioned. Dr. Carpenter, in his zealous desire to perfect the sanitary condition of the institution, has in contemplation a plan of procedure that will require some considerable labor, but not much money, which, being explained, was most cordially indorsed by me, and the doctor advised to complete it as soon as possible.

While there was much to admire, there were some matters that I most

emphatically and positively condemn. The wooden bedsteads I have mentioned as subjects to condemn. While lime is so cheap, and lead and oil can be so easily obtained, I must say that if more attention were paid to a copious and bountiful application of whitewash and paint, the condition of the building would be much improved.

Respectfully submitted.

C. A. RUGGLES, M.D.

INSPECTION OF INSANE ASYLUM AT HIGHLAND.

Having been appointed a committee to make a sanitary examination of the Insane Asylum at Highland, in San Bernardino County, I most respectfully report that, unannounced and unexpected, I arrived at the institution on the morning train from Los Angeles, April 18, 1896. I was very courteously received by Dr. Campbell, the Superintendent, who kindly extended to me every facility for fully discharging the duty assigned to me.

The first thing that I was obliged to harshly criticise and condemn was the overcrowded condition of the institution. The dictates of humanity should cause the proper authorities, those who are responsible for this unfortunate condition, to immediately relieve that deplorable state of things. In this overcrowded condition it is something remarkable that disease has not pervaded the building, and death claimed as victims many of the unfortunate inmates. It is surprising that discipline and good order can be as well maintained as it has been.

The food was very closely and critically examined, and was declared to be of first-rate quality.

The bedding and clothing of the patients were closely inspected, and were found to be all that could be desired.

The sewerage of the institution was good, the plumbing all that was necessary.

The ventilation, on account of the overcrowded condition of the rooms and halls, was somewhat impaired.

There is great need of a change in the water-supply, which I am informed has already engaged the attention of the Directors and will be attended to as soon as possible.

The Superintendent and subordinate officers are entitled to much credit for the management of the institution under such embarrassing circumstances.

There is one feature in connection with this institution that is not as generally known by the public as it deserves. I refer to the fact that it is the only one of the hospitals for the insane where the inebriate is received by committal for treatment. That inebriacy is acquired in very many instances, no one questions. That it is a species of lunacy inherited in other instances, must be acknowledged. And the great heart of humanity must rejoice to know that the State has provided a place for curative treatment other than in county jails and houses of correction.

I congratulate the Superintendent on the favorable result of treatment in the cases that have been placed under his care.

Respectfully submitted.

C. A. RUGGLES, M.D.

STOCKTON, August 20, 1896.

REPORT OF DELEGATE TO THE NATIONAL CONFERENCE OF STATE BOARDS OF HEALTH.

To the President of the State Board of Health of California:

DEAR SIR: In pursuance with a call issued by the Executive Committee of the National Conference of State Boards of Health, a meeting of that organization was held at the Auditorium Hotel, in Chicago, on June 10, 1896, and was opened in due form by Dr. Taylor, of Indiana, the President, all the officers being present. Addresses of welcome were made by his Excellency the Governor of Illinois and his Honor the Mayor of Chicago, which were ably responded to by President Taylor. The usual reports of officers were read and approved. There was not as large a representation from the different States as was desired, but what was lacking in numbers was made up in enthusiasm and deep interest in all the proceedings.

At a previous meeting of the Conference a special committee was appointed to visit and ascertain the condition of the various vaccine farms. Dr. Swartz, of Rhode Island Board of Health, was chairman, and made a very able and exhaustive report. From personal inspection and reliable information carefully obtained, he was able to present to the Conference a very interesting and instructive account of the production of the bovine virus of the different farms in the United States. There appeared to be a very considerable sentiment among the delegates that properly obtained humanized virus was superior in its results to bovine virus, but that in time of epidemics, when it would be necessary to use large quantities, it might be impossible to obtain the desired amount, so it was considered advisable to encourage the production of a reliable bovine article. Among the different articles of bovine virus mentioned in the report, and the manner of preparation, the delegates probably made up their minds as to the purity of each. I do not hesitate to say that my preference was for two articles, one made by the Minnesota farm, and the other by Dr. Welcker, of Milwaukee, Wis., with a most decided preference for the latter. It is prepared with the greatest care as to purity, is hermetically sealed in glass tubes, thus protecting it from changes of atmosphere or contaminating surroundings. The purity, as claimed, has been frequently established by bacteriological examination by the Health Department of Chicago, which used it, with very satisfactory results, during the last epidemic of smallpox in that city, in preference to any and all others. The committee was allowed further time for examination as to other establishments that limited time had prevented.

The delegates of the different States were called upon alphabetically to state what improvement in sanitary matters had been perfected during the year past. The improved methods of gathering statistics and reports as to sanitary condition of different localities were mentioned. When it came to California, your delegate was much complimented and highly flattered by the close attention paid him and the interest mani-

festes as he related the action of our Board relating to procuring antitoxine for diphtheria, particularly so, when informed that it was free to all, simply by asking for it and complying with certain requirements of a clinical nature. Great interest was manifested in my relation of our protection from invasion of smallpox by the placing of inspectors for examination of passengers on trains. The statement as to the antitoxine for diphtheria naturally created an interesting discussion among the other States, but the universal sentiment expressed was in favor of it, particularly by Dr. Murdock, of Chicago, who had municipal control of diphtheria in that city, whose able, concise, and comprehensive report on that subject fully confirms the most sanguine statement made as to the prophylactic and immunizing properties of the diphtheria antitoxine.

It was surprising to me to hear mention, by the delegates from the several States, of the great amount of sanitary-instructive literature circulated by them as to the communicable diseases, particularly as to tuberculosis. It is mysterious why so great an effort should be followed by so small and meager result. Year after year each board puts out its printed matter broadcast over the land, endeavoring to warn the people and instruct them how to evade the trouble. Yet the Pale Destroyer goes on in its relentless progress, regardless of all our efforts to stop its march, as the yearly reports show no diminution in the death-rate from that disease. One possible way of accounting for this apathy or indifference is the fact that the unfortunate victim is the very last person to realize or believe that this literature, these precautionary remarks, are intended for his instruction as to expectoration, etc., but must have been intended for some one else. Recognizing the communicability of tuberculosis from animals to man by means of milk, indorsement and encouragement were advised to be given to all local Boards of Health to persevere in the tuberculin test and the destruction of animals thus detected to be infected. The opinion is fast gaining ground that the time is not far distant when legal restriction will be resorted to as a preventive measure, as from reliable source I learn that the City of Boston has recently declared to be a nuisance a consumptive home located at Greve Hall, in a closely settled portion of that city, and has ordered its removal before 1900. Many Eastern cities have become much interested in preventing children afflicted with the disease from attending the public schools, extending the same prohibition to teachers.

In this same connection it is proper to mention that a communication was received from the Bureau of Animal Industry, stating that Congressional action was being taken to prevent scientific investigation in animals, the sole aim of which was for the relief of suffering humanity. A resolution was unanimously adopted to oppose by all possible means the adoption of any such measure.

Among the many courtesies extended to the Conference was one seemingly of more importance than any, viz., an invitation extended in person by an officer of the Commission to make a visit for inspection of the drainage canal of the sanitary district of Chicago, which invitation was gladly accepted, and, in a train of cars provided by the Commission, the Conference, accompanied by many other invited guests, devoted nearly a day to a close and rigid inspection of the great work. It is a great work, and does much credit to the brain that originated it and to the indomitable effort and perseverance of those engaged in its construction. It is 135 feet wide, 35 feet deep, and extends from Lake Michigan

to the Mississippi River. Much was said and shown to be its commercial advantages of ready transportation from the lakes to the Gulf of Mexico, but of these points we took but little interest, as the most that concerned us as a Conference of State Boards of Health was its sanitary importance. The sewage of the City of Chicago finds its only outlet into the river and thence into the lake, whence all the drinking-water of the city is taken. The population of this city is increasing in a wonderful degree, and the possibility of its drinking-water being now contaminated by sewage, will soon be converted into a positive certainty. Among all the plans proposed for an alleviation of this great calamity, the most feasible and surest to gain the desired end was the drainage canal. Much brain and time and money must be expended before the completion of this magnificent work, but much confidence is expressed as to its final success. When we consider the magnitude of this great metropolis of the West, the danger from contaminated drinking-water to which they are daily exposed—when we think of the amount of disease and probable death with which this people must soon be necessarily surrounded, we cannot refrain from extending to them our sincere wish for a speedy completion of the great work and the most perfect success to attend its finish.

A magnificent banquet, with which the most fastidious epicurean could have found no fault, was prepared for the many invited guests. After which speeches were in order. Truly, it was a feast of reason and flow of soul. For the pleasurable enjoyment of the same we all extended our unanimously adopted resolution of thanks.

On the day following, an invitation from city authorities to visit the crib in the lake was accepted, and in a finely furnished tug we traveled around, inspecting the city water-supply. Surely, it was a plan for a good water-supply, grandly conceived and as finely executed. But our sympathy was excited by the unfortunate necessity, on account of bad sewerage, for the expenditure of so much money. But at the same time extended our congratulations in the belief that soon the drainage canal would relieve all ideas suspicious of bad, contaminated drinking-water.

An invitation from the Governor of Tennessee and the Mayor of Nashville for the Conference to meet in Nashville in May next was received and accepted. The Executive Committee will fix the exact day.

After the election of officers, the Conference adjourned.

Respectfully submitted.

C. A. RUGGLES, M.D.

STOCKTON, CAL., July 20, 1896.

REPORT OF THE COMMITTEE ON THE SUPPRESSION OF
INEBRIETY.

By P. C. REMONDINO, M.D., of San Diego.

To the President and Members of the State Board of Health of California:

GENTLEMEN: In compliance with your instructions, I have the honor herewith to place before you the result of my investigation into the much vexing subject of the cause, existence, and remedy of inebriety, a question simple enough to manage could it be diverted and thoroughly separated from its many entangling environments and graftings—environments and graftings created by sectarian prejudice and by many good-intentioned people, but which have neither natural connection nor bearing on the real matter; and whose unreasoning interference and intrusions, in my opinion, only tend to increase and spread, rather than diminish and do away with, the evils. The north of Europe and the British Isles are in many ways similarly situated and embarrassed with the same questions, except that inebriety does not there so much affect the professional and business, as well as the leisure class, as it does with us, especially on the continent. Faulty education as to really what constitutes ethical conduct makes many irresponsible and helpless sinners against the laws of sobriety, just as injudicious enactments oftentimes create criminals that are only legal but not moral criminals.* Legal enactments, injudicious governmental actions, and the inconsiderate actions of not sufficiently broad-minded and impartial statesmen and moralists, have, in an indirect manner, too often contributed to the creation and spread of inebriety, either while thoughtlessly pursuing some other and unconnected polity of government, or even while directly attempting to suppress that which they were actually but unconsciously not only fostering but also encouraging.

The above remarks will be explained in detail further on, where examples will be given of the evils which a government can thus inflict on a people. In looking backward, however, one cannot help but wish that, for the cause of temperance in the matter of drink, as well as for that of temperance in avoiding either extremes of jollity or of melancholy, either the House of Stuart, with its perfumed and curled and much embroidered and reckless dandies, or their opponents, the severe and bilious-countenanced Covenanters, had never existed; but we much wish that, in their place, there might have been successive generations of healthy-livered Robin Hoods and his merry men in green, with their opponents, the sturdy but well-fed royal retainers, and the smooth-faced and jolly-bellied bishops and abbots, even if they had now and then to dance a hornpipe

* While Anglo-Saxons and Americans contend more for absolute abstinence, they do not make of inebriety such a social crime as it is considered among wine and beer drinking nations. There, the temperate use of wine and beer is perfectly consistent with an upright conduct, but no intemperance or drunkenness is tolerated. With us, we condemn temperance and condone intemperance.

on the woodland green, as the sylvan creations of Theocritus were wont to gladden the wooded dales of the isles of the Mediterranean Sea, for the amusement of the merry men of the greenwoods. Had not the frivolous Chevaliers called into existence the stern and unrelaxing Roundheads, men possessed of all the abstemiousness and severity of morals of a John the Baptist, but with none of his charity or abnegation of spirit, America would not probably be wrestling with the subject of intemperance and inebriety to the extent that she is at this time. It seems as if, with the downfall of the Stuarts, a more of a middle-of-the-road code of convivial ethics might have been adopted, some that would have prevented the Anglo-Saxon race from becoming such horrible examples of moral depravity as is evidenced by their tendency to inebriety, and that better counsels might have prevailed in directing the trend of public morality as well as of government.

Such counsels did not prevail, however, and the perverted and unnatural ethical code that gradually invaded England from the north, with such hostility and chilling repression of all natural sentiments that it seemed as if the long-receded Ice Age, which had left its geological and archæological vestiges on the green and wooded landscape, was about to reinvade its old possessions. Unfortunately for America, the cream and essence of this chilly blast of St. Anthonic morality in its dissenting garb, coming from the north, was forced to emigrate, and finally found a home upon the shores and hillsides of New England. These people were most certainly and undeniably good and strictly moral, and their good intentions are unquestioned, but they did not carry into their life a sufficiently broad or cheerful view of the world, or of creation, so as to cover all possible reactions and retroactive processes that might result to their descendants in this mundane hereafter, and to others, from their line of adopted and too strictly enforced repressive conduct. Unlike to John Wesley, they failed to look beyond their present. Wesley was not a little perplexed when, in looking into futurity, he foresaw the accumulation of wealth that would naturally center among the members of his church as a result of the frugality and economy, abstemiousness and self-denial, which the rules of the church entailed upon all of its members, who were thus supposed to live a life just the opposite of that indulged in by the gay courtiers of the time of a Charles II or that of a Louis XV. He but too well realized that, by the law of natural reaction, the accumulation of health and wealth thus garnered must, sooner or later, find a reactive outflow; that retroactively here was being gathered an arsenal of future corruption, and that both the physical and spiritual welfare of the descendants of his good flocks must, in the end, suffer the consequences. Wesley recognized this active and unescapable law of ethical gravitation, as it might be called, that affects morality and depravity, as well as he was aware of that law of gravitation which affects all that is ponderable in our planetary system. Our New England forefathers did not take this same view of their course and method of life, but seemed to have imagined that theirs was a race entirely different from any that had gone before, or possibly, as before said, they did not give a thought beyond their immediate present. That a reaction would follow, or that their methods were only adapted to the times and circumstances of the days of Cotton Mather, seemed never to have passed their thoughts, any more than it seemed to have occurred to them that their repressive methods would ill

fit or ill accord with other races or other temperaments, and that possibly entirely different effects from those desired might in the end be the result.

No philosophical student of history or sociology will, however, blame or condemn the poor, persecuted Puritans, who were forced, for the exercise of freedom of conscience, to flee from their native land to brave the hardships and privations, as well as dangers, to be encountered on the bleak and wintry shore to which they directed their course. There is no lover of mankind or of personal liberty but must reverence those old heroes who, rather than submit, were willing to brave all the new and unknown terrors that awaited them; no manly heart but goes forth to these persecuted people in their calamities and distresses; and no manly heart but honors their bravery and endurance, as well as the stoical character of their rugged natures, through their migrations and struggles to found a new home.

However differently we may now look upon their repressive and somber code of mixed religious and ethical morals, we should not forget that they were as logical an outcome of the moral, social, and political corruption of their times, just as much as the plebeian, noble, and even princely hermits who, preferring a life in the deserts to further communion or commerce with the vile corruption that punctuated the declining days of the greatness and opulence of Rome and its provinces, dotted with their huts the ravines and hillsides of the Asiatic and African wilds. The pilgrims were by no means the first of their order, as they will not be the last. The frivolous voluptuousness of the court of Mary only served to bring out in stronger relief the sentiment of Knox, and to make those sentiments more pronounced and more self-assertive, just as *the* Diogenes never would have existed but as an opposite to the luxury and vanity of his brother philosophers. So, in a like manner, with the profligate court of the English Stuarts, the repressive and morose Puritan was but a natural and counterbalancing result, just as his brother Huguenot went to all extremes of moral severity and demeanor, in contradistinction to the frivolous and debauched bearing and conduct of the dandies and pets of the courts of the princes of the House of Valois. No one will read the journal of Pierre d'Estoille, chronicling the daily doings of the pets of Henry III, without offering thanks to Heaven that the Huguenots arrived on the scene at that time to act as a counterbalancing factor, as otherwise France would soon have seen reenacted the horrible scenes that dotted the darkening days of Nero's reign.

There comes a time in the course of the diseased condition of morals, as in the course of the disease of an individual, when the order and quality of the remedies, diet, and daily exercise and recreation must be changed to suit the exigencies of the case, and it is just here where our Puritan friends seem utterly to have failed in discovering that the causes which called their mixed code of ethics and religion into use had as utterly passed out of existence, and that they might as well settle down to a life like that followed by their Teutonic or Gallic neighbors, or live more freely, like their compatriots and brothers of the Anglican Church. They have failed to realize that it was an unnatural order of affairs that called for the equally as unnatural, repressive, and severe ethics of their sect; that the further administration of this remedy, when there exists no cause for its continued administration, produce unlooked-for and

undesirable results, and that in modern times their extreme ethical ideas, as governing every phase of daily life, are as far out of place as a modern monarch would be in imitating the example of Henry II undergoing flagellation at the tomb of Thomas à Becket, or as a modern bishop or cardinal would be in attempting to reenact the rôle of a Torquemada.

As Felix Oswald well observes, the religions of the ancients exalted vice as well as nature, and now our modern religions suppress nature as well as vice, and we are struggling toward a more rational as well as a more practical religion, one which will teach us to discriminate between vice and nature. Those good people undertook to spiritualize man and to utterly abstract him from that nature of which he is an inseparable part, a result that cannot be attained without a return to the monasticism of the early Christian centuries, with all of its self-denials and strict following of the gospel injunctions. It is only as a *whole* that we can be truly literal followers of the Master, and no half-way repentance with unending reservations will accomplish the intention of being thoroughly good.

As observed by Canon Kingsley, "To an age of luxury and unbelief has succeeded more than once in history an age of remorse and repentance as well as of superstition. Gay gentlemen and gay ladies renounce the world, as they did in the time of St. Jerome, *when the world is ready to renounce them*. We have already our nunneries, or monasteries, of more creeds than one; and the mountains of Kerry, or the pine forests of the Highlands, may some day once more hold hermits, persuading themselves to believe, and at last succeeding in believing, the teachings of St. Anthony, instead of those of our Lord Jesus Christ, and of that Father of the spirits of all flesh, who made love, and marriage, and little children, sunshine and flowers, the wings of butterflies, and the song of birds, who rejoices in his own works, and bids all who truly reverence him to rejoice in them with him."

It was the somewhat altered and amended teachings and ideas of St. Anthony that our good people, flying from English corruption, brought to our shores—teachings that make no account of nature any more than they do of physiological demands. Cheerfulness and mirthful recreations were grievous sins, and neither were, therefore, permitted, to say nothing of being thought necessary to health or longevity. To use the words of Oswald, they failed to realize that, with few exceptions, the children of Christendom are stricken with a disease which mirth alone can cure, and that it is especially so in the colonies of North America and in parts of Great Britain, where "it is pitiful to witness the slow withering of so many light-loving creatures in the hopeless night of poverty and sabbatarianism; more pitiful to see the reviving of their spirits at every deceptive sign of dawn, the expedients of poor, compromising nature, her makeshifts with half recreations and half sufficient rest, in the lingering hope of a better future—to come only with the repose from which no factory-bell can awaken a sleeper. Man cannot conquer God-sent instinct, though he may for a time defy it—with poison; the most incurable victims of intemperance are they who resort to stimulants, less for the sake of intoxication than for the benumbing after-effects, which helps them to stifle the voice of outraged nature." Just as many a poor Scotchman has found to his cost who had to choose between the oblivion of a calm, still drunk, or the enervating

effects of a droning Sabbath sermon, and the mental and physical apathy of a typical Scotch Sunday.

Intemperance and inebriety have, therefore, as we have seen, other sources of creation than those exerted by the mere presence of the saloon or of liquor; but, as we shall see, they often depend upon sins of commission upon the part of those who should be better trained or who assume to control the destinies of their fellow men.

The liquor question is, in the United States, as an inheritance of our Puritan Fathers, an ever disturbing as well as an ever absorbing and ever upheaving question. Looked upon as blessings and as foods by the southern Europeans, beers and wines here are looked upon by many as curses. Just why the products of the carefully cultivated vineyards or hopfields, which are such necessary and industrial supports to whole sections of Europe, as well as of America, and which are now among the main industries of California, or why the products of California barley—California produces the best barley for malting purposes, and the crops of its best barley sections are always secured for consumption by the breweries of the East—should be looked upon with such dread and disfavor, if not with positive hatred and muttered curses, are all really unanswered questions, unless it be that the questioner is indignantly asked whether the demon of inebriety that stalks through the land, sowing discord and mental and physical destruction, along with every phase of moral corruption and degradation, is not sufficient answer to the question.

Without any further questioning, and as a simple result of a surface investigation from cause to effect, the prevalence of inebriety in the United States, and all its attendant evils, is at once, unhesitatingly, and without any distinction, ascribed to the presence of beer, wines, and liquors. With the simplicity and laconic reasoning that animated the followers of the Prophet in their dissemination of the Koran, the modern temperance or prohibition crusader bends all his energies to the suppression and destruction of the evil, reasoning that with the absence of the cause the evil must cease to exist. To this end he would uproot the vines that give us beer or wine, as well as stop the use of barley for brewing purposes, and thus overturn the thrones of Bacchus and demolish his statues and end his worship. Like to the early crusader, inflamed with a pious and earnest zeal, the new prohibition crusader only sees the evil and the cause, and in his burning anxiety to overcome and destroy the latter, and relying upon the justness of his cause, he is too apt to look upon any thoughts that might counsel more considerate judgment as evidences of the intrusion or workings of Satan. The careful study of the subject, the question of the equity of all parties concerned, or of the direct injury he may inflict on commerce or on the agricultural and industrial pursuits, are now all matters of minor considerations compared to the great and primary need—the destruction of alcohol. The question of the need of any liquors as foods or beverages is sternly set aside, in the face of the glaring evils visible, as a subject hardly worth considering.

It is needless to say that, however opposed all good-intentioned men are to the existence of all the moral, mental, physical, and financial injuries that inebriety may and does inflict upon a community, the lack of study applied to the question, and the consequent hasty, inconsiderate, and unjust methods adopted for its amelioration, have, in the end,

resulted in a very small amount of good, in contrast to the injury that has been a continued result from the presence of increasing inebriety as well as from the great injury inflicted upon the moral ethical bearing of the nation by the resulting forcing of the saloon into politics, where it has become a most influential, as well as corrupting, factor.

Paradoxes are the rule rather than the exception in the wonderful sociological changes that have taken place in the history of the world. The great conquests, and the great resulting wealth of Spain, were, as most philosophical historians tell us, the direct causes of her ruin. The poor Britons found harder masters when they called the *outré mer* barbarians to their assistance against the incursions of the Scots. So it was with the evolutionary history of Spain. The Carthaginians called to assist in the defense of Gades finally dispossessed the Phœnicians and Celtiberians, and the remnants of the latter who called in the aid of the Romans became themselves subject to Rome, while the Spanish Inquisition only fastened and strengthened the Reformation it was intended to destroy. In a like sense it will no doubt astonish many earnest workers in the cause of temperance to learn that their extreme and inconsiderate prohibitory measures have, in the end, however opposite intentioned or unconsciously, been the means of creating and fostering inebriety, not only alcoholic, but also the still more numerous inebriety due to drugs.

These results are the logical and rational outcome of a non-acquaintance with a subject which is made the object of such violent and inconsiderate attacks, and from totally ignoring its physical and sociological bearings, as well as its physiological uses or abuses and medical phases, and in insisting upon looking at the matter from a purely religious or an ethical point of view—a consideration of the subject which relegates it to the religious bodies, which, unfortunately, in their present evolutionary stages, are the least able or prepared to treat it intelligently. The purely ethical view takes no consideration of the influence of race upon the subject, or of the many evolutionary processes that have made some races and nations peculiarly immune to the influence of alcohol, while others are as peculiarly subject to its influence in the most marked degree. To many of these zealous but inconsiderate workers, the questions of climatic, isothermal, and sociological influences, the influence of governmental polity and of legislation, as well as the influence of home-training, upon the production or elimination of inebriety, are set aside as questions that are utterly irrelevant, immaterial, and inconsequent, and the subject is disposed of in the arbitrary manner of those who rely too much upon the importance or potentiality of ethical rules, just as Amru, the Saracenic General, ordered the destruction of the famed Alexandrian library.

That the mere presence of beer, wines, and liquors is not the sole cause of drunkenness among the human race, has been evidenced by the sobriety of the Greeks among the ancients, as well as by that of the modern Romans—a sobriety which is the common characteristic of all Latin and Teutonic people where wine and beer are found in the greatest abundance and at the lowest prices, as well as in continued use. Here it is where the purely religious and ethical view of the subject has done the United States a great harm, by insisting upon the adoption of just the opposite means that are in daily use among those nations where drunkenness is as rare as it is common with us. Looking upon

drink of all kinds as a demon to be kept at bay, and on alcohol in any percentage as upon something that conveys an idea of sensuality, immorality, and devilishness in its very name, smell, or presence, we have even denied ourselves the right of inquiry as to the reason why the nations with whom wines and beers are most abundant, cheap, and in constant use, are among those which are proverbially the most sober, as well as no more immoral than ourselves.

As remarked in a previous paragraph, sociology is full of paradoxes. In one instance we have a nation with one of the greatest ratios of illegitimate births on record, throwing stones and making faces at another nation whose illegitimate ratio is proportionately far smaller, but whose morals must, according to the strabismic ideas of the former concerning ethical conduct, be perfectly horrible, on account of the theaters, art museums, pictures, and statuary, possessed by the latter; and the tendency to view life in the more jolly way indulged by the latter, in comparison to the austerity with which the former nation has encased its ethical bearing, as if in an old-fashioned, straight German corset, is looked upon as further evidence of being on the broad road to destruction. In like manner, without any further consideration or investigation, the simple use of any alcoholic beverage—whether it be light wine or home-brewed beer containing the one half or the thirtieth per cent of alcohol, or whether it is absolute alcohol only slightly diluted with water, being all the same to these good but inconsiderate workers, so long as any of the “demon” alcohol is in the beverage—places any people, in the estimation of these good but misguided and most uncharitable people, in the category of the drunken, highly immoral, and going-to-the-devil class. Unable to comprehend morality or strict ethical rectitude compatible with the ingestion of a rum omelette, assisted by a glass of generous Burgundy, with the presence of one of Canova’s works of art on a near pedestal or of one of Kray’s, Bouguereau’s, or Beaumont’s canvases on the wall, these good-intentioned people would fly from the presence of a Plato or of a Seneca into the embraces of a Reverend Brown or of a Durrant, or of any modern representative of Charles Dickens’ character Elder Stiggins or the Shepherd.

It is time that American civilization should take the proper view of these subjects. Everything repulsive is not necessarily a means of grace, and there are no sensible reasons why, with the doffing of that religious bigotry which saw salvation in a filthy hair-shirt, covered or filled with vermin, or in the continued absence of the bath or abstinence from shears, comb, or nail-brush, we should have retained as necessary that melancholy demeanor which, like the creed of St. Anthony, can only see perdition in anything that is cheering or elevating, and which can only perceive salvation in continued mortification and lugubriousness, and, like to the dyspeptic saints of old, the devil in anything that is pleasurable.

To what extent we are indebted to a pessimistic religious influence for these distorted views of humanity, we may mention that, according to the relation of Hazlitt, we are told that Coleridge, on reading that beautiful as well as spiritual production of St. Pierre, “Paul and Virginia,” became convinced that the modesty exhibited by Virginia in the final shipwrecking—an exhibition of maidenly modesty only equaled by that shown by the early Christian maiden martyrs—was a proof positive of the prevailing tone of French depravity. Poor Haz-

litt, a bright, critical genius, the son of a Unitarian minister, himself a victim of the misconceptions to which he gave rein, was one of the results of misguided and distorted education. Divorced at forty-four, after fourteen years of unhappiness, he again married, only to separate within a year, then to fall in love with a servant girl of questionable reputation, dragging himself through life with a beam in his own eye, while in terrible worry over the mote which he imagined he saw in that of his neighbor.

To go into the study of the subject of racial tendency to drink and of its causes would occupy more space than I intend to give to this report. I shall, therefore, attempt a curtailment to the discussion of the subject in its medical and sociological aspects, and endeavor to point out the way of salvation from the many quagmires of inebriety in which we are now floundering—floundering without any visible hope of early extrication, but simply spluttering and spattering mud about in goodly quantities and in every conceivable direction. That my suggestions will not prevail against habits of thought formed by education and custom, amounting to deep-rooted prejudices, is quite plain to me, but in making my suggestions I shall have the consciousness of having possibly set some toward a more considerate study of the subject, as well as of having done my duty to our people.

It is a well-known fact that before wine increased in price—when light wines were cheaper in price than the barrel that contained them—the French knew but very little inebriety. It is only since the increase of the price, and since wine has been necessarily supplanted by stronger spirits on account of their greater cheapness, that inebriety or intemperance has made any progress in France. Not alone have we the authority of the French themselves that this is the case, but even the testimony of such an acute and impartial observer and great ethical writer as Philip Gilbert Hamerton joins in the conviction that to grow sound light wines is an immense blessing to any community, because it offers a successful rival to strong spirits. Light wines are exhilarating but not brutalizing. The disappearance of these light, cheap wines, and their replacement by heavier and higher-priced wines, has been a great injury to the lower French classes, who, as a consequence, have been driven to the use of cheaper but stronger spirits, with the same effect upon them that is observed upon the common Londoner, or the lower inhabitants of Glasgow, who are proverbial dram-drinkers.

California possesses, in her soil and climate, the means of undoing a great deal of the national inebriety; but to attain that much wished-for result, we must encourage the cultivation of those cheap light wines which formerly did so much for southern Europe. At present we discourage the use of these wines to an extent that the want of a market prevents their production, and by discouraging the production and use of the light wines we stimulate the production, and therefore the use, of the heavier wines and brandies against which we so declaim. California has and does produce many qualities of wine which the producer could, with still greater profit, divide into two grades as to quality and prices, as a light and a heavy wine. Our best wines could thus be made to offer a light table wine for general consumption that would be extremely cheap.

Among these wines, we produce the Tokay wine, made from a large meaty grape that is a native of Hungary; the California wine that I

have tested is in every respect the equal of the Hungarian product. A gentleman formerly a resident of National City had a solitary grape-vine of this variety, growing in his chicken-yard, with the branches trailed over a frame extending toward the chicken-house. From the products of this one vine, besides using all required grapes for dessert purposes for himself and wife, he made eighty gallons of light wine and forty more of a first quality of sparkling Tokay that had not its superior in any Hungarian nobleman's cellar. The mode of making this latter or first quality wine was, in its primary methods, superior to any probably adopted even in Hungary, as he carefully washed and picked each grape from the stems and deposited it in a huge flannel, inverted cone stretched on a hoop, and from the pressure of the natural weight of these grapes came the best wine. The subsequent or light wine he secured by the same process, to which in addition he applied the press. This light wine was most agreeable, just the proper article to drive away that wind from the stomach which results from despondency and sourness of temper.

I think that a freer use of this light and cheery wine would be most useful in remedying that tendency to miserliness which is such a growing evil in the nation, and such a natural outcome of our strabismic education as to our way of looking at the world and at people. Without tending to make us as profligate and reckless as Indians who have suddenly acquired some little wealth, or as wealthy as a Mexican peon who has come into possession of fifty cents, it would tend to make us more charitable and generous and put away that unpleasant illusion, which hovers in the horizon of so many, of the over-the-hill poorhouse door opening for our entrance, and that, too, when we are in the midst of plenty. From my experience among many in good circumstances and among the so-called unfortunates who make the poorhouse their last home, I am constrained to believe that when Julius Chambers, in his "Mad World," described the feelings and actions of the happy lunatic, then poor, but formerly very wealthy, who had never known a moment of real happiness until a sudden reversal of fortune's wheel robbed him of all he possessed and landed him a financial wreck and a helpless lunatic in an asylum, feeling rich as a feudal baron, whereas in his previously seeming sanity he had felt poorer than Job's turkey, he (Chambers) wrote from an actually observed case, as the comfortably-off seem actually to suffer more from the fear of poverty than the really poor do from its actual presence. A little exhilarating Tokay wine will not only improve digestion and promote a better assimilation, but it will do away with this form of life-shortening melancholy which, like the formation of the verdigris, eats into the joints of our life.

Besides this grateful and cheerful product of the Tokay grape, California is peculiarly happy in her varied qualities of light Clarets, light Burgundies, and Sauternes, which make most excellent and palatable light table wines. Her sweet wines are too heavy and alcoholic, as well as lacking in bouquet, for either table, dinner, or dessert wines; they are altogether too heady and strong, but some of the heavy-bodied wines of Spain and Portugal are here well reproduced and make excellent dessert wines. We shall, however, not recommend these heavy wines, at least not for the purpose of the subject of this report, especially as we feel that the list of light wines is so extensive that we need not recur to the heavy wines, even if used well diluted with water. Among these

light wines we find the representatives of the vines grown on both banks of the Rhine. A most excellent and fragrant wine, very much like the best brands of Hocheimer, is made in the Sonoma and Napa vineyards. It is here a dry wine, and although a white wine, we have never seen any injurious effects to the nerves following its use. Unlike many of the white wines, it stands watery dilution very well at the time of its use without loss of flavor, and I have often prescribed it as a steady table wine used with water or some of the many *eaux gazeuses* which materially aid its action as a promoter of digestion. No man who uses steadily of the Hoch made in our California vineyards, uses it well diluted and at table, will ever become a drunkard, or a suicidal victim of sober despondency.

We have often drank at our dinners a light wine very much like the German lighter grades of Rudesheimer, made from vineyards in the neighborhood of Los Angeles. During medium dry years the quality of the grapes from whence this wine is made is much better than in other years, and the wine is then also correspondingly much better, both as to body and as to bouquet. The light Riesling—if not too acid, a decided objection to many, especially to those affected with acid indigestion and who cannot use either this or even any sweetish wine without discomfort—is, next to Hoch, one of the most delightful of white wines, although, for my part, I give Hoch the first preference, after which I take either Tokay or Burgundy, avoiding Riesling on account of the slight acidity which I always find to be one of its characteristics. Some of the Tokay wines that I have sampled might be called white wines, as I have seen some as light as Hoch, or as clear-colored as Catawba, although made from a rose-colored grape.

California also produces some excellent wine made from the orange and other fruits. To me, however, these are too bitterish sweet or too syrupy to be used for a beverage, the tendency of which is too often to create an attack of acid dyspepsia. This objection I also find to the use of many of the unfermented wines, as well as to some of the malt preparations, they being of such a sweet taste and of such a syrupy consistence as to bring on attacks of acid indigestion. One of the unfermented wines made from the Isabella, a very dark purplish grape, although of most excellent flavor and a most delightful beverage when diluted with about five sixths of water, I found to be very constipating and therefore an undesirable wine for steady use, unless partaken of in company with a rather relaxing bill of fare. Of course, I have seen those who drank of it very sparingly who did not experience any binding effects; but those who cannot drink either this or any colored wine without becoming constipated should drink light beers.

Sherry, Port, Malaga, Madeira, and Malmsey are all too heavy and rich, and can hardly be classed as table wines. They are fine dessert wines, and also appropriate for lunches, or very useful as tonics where the average light wines are not specifically heavy enough, but must be partaken of in very small glasses. Madeira and Port contain about one half the percentage of alcohol as found in American whisky. Brandies and foreign whiskies contain about 5% more alcohol than the American brands. I should class all these heavy wines—wines averaging above 12.50% of alcohol—as very undesirable for table purposes, although many of these contain a much lighter percentage; for our purpose, the less the percentage of alcohol consistent with the keeping of

the wine in good quality, the better. The celebrated high-priced wines of the Vesuvian vineyards near Naples, and of Sicily, are remarkably heavy, and should only be partaken of very lightly as a dessert wine. The *Lacryma Christi* contains about 20% of alcohol. Luckily, these very tempting wines are not within the financial reach of many.

The dangers to the community from the introduction of native wines as a table beverage are more ideal than real; in fact they are a positive benefit. The late Dr. H. I. Bowditch, of Boston, with whom I enjoyed the pleasure of a long correspondence up to a short time before his death, took a broad and liberal view of this subject—a subject to which he has devoted no little time and very conscientious study; while, with his systematic order of mind, he carefully collected and compared data from every point of the world that could throw any light upon the subject, and in the interest of practical temperance. He watched the growing wine industry of California with considerable interest, as he foresaw in its success a most valuable ally in combating the growing evil of inebriety and immorality. Addressing James Morrison, of Quincy, Mass., who was then very familiar with the subject-matter, and asking him if the fact of wine being made in California tended to drunkenness, or otherwise, he received the reply that, before the introduction of the native wines, drunkenness was quite common in California, but that since the native wines were found in nearly every home, they had supplanted, to a great extent, the use of stronger alcoholic drinks. The introduction of the grape and of the wine-press performed a like beneficent duty for Ohio, as we will see from a note to Dr. Bowditch by Larz Anderson, of that State, who mentions that his fellow-citizen Mr. Longworth conscientiously believed that he was giving the cause of temperance most practical aid by encouraging Ohioans to plant and cultivate the wine grape.

Among the many interesting answers to the inquiries sent out by Dr. Bowditch to broad-minded observers interested in practical temperance work is the following from Y. G. Hurd, of Ipswich, who, after detailing the seeming hopelessness of enforcing prohibition, makes the following observation :

“A visit to Chicago in 1868, and my observation there of the habits of the German population, first brought to my mind doubts that total abstinence will ever be an accomplished fact. I visited the beer-gardens on Sunday, to see how the Germans spent the day. There was a band of music, a dance floor, rude seats and tables like at our New England picnics in a beautiful grove, and lager in such quantities as I had never conceived. Everybody, old and young, drank and seemed to continue to drink during the afternoon. But lager was the only beverage—no liquor, no drunkenness, and no fights or disorderly conduct. The young men and maidens were merry and danced; the elders drank and talked with a gravity and dignity becoming to the respectable German citizen; the children sipped their mug of lager and gamboled on the grass, and all went home apparently sober, to resume without doubt their usual vocations on the morrow. There were probably two thousand persons taking their weekly recreation. And this is only one of half a dozen similar places about the suburbs of the city. Now, if this had been an American or Irish congregation, and the beverage the usual vile concoction called whisky, gin, and brandy, would not the closing scene of the afternoon have been very different? Broken heads, bloody noses,

and the way-side strewn with the wrecks of humanity in a state of beastly intoxication. I thought, if we could be rid of the grosser liquors—banish them—put them in the pale of dangerous drugs, to be dispensed only by the physicians like other poisons, and substitute the lager of the Germans and the light wines of France or of California, should we not be doing our best to exterminate the curse of drunkenness? I expect that we shall yet come to this conclusion."

Gentlemen of observation who have traveled abroad and have thus become more or less conversant with the habits of southern Europeans, are, as a rule, converts to the temperance influence exerted by the use of light wines, and have all abandoned prohibition as a practical or useful measure. How much and how far this view of the case influences persons in position to judge for themselves may be gleaned from the following relation. It was at a time when American flour was taxed four times as much import duty as was asked for Spanish flour for an entry into Cuban ports, besides paying a certain high percentage of tonnage for in-coming American ships, Spain doing this to protect and favor her own shipping as well as her own productions and manufactures, and also to compel the Cubans to deal more exclusively with the mother country. Horatio J. Perry, of the United States legation at Madrid, labored long and tediously with the Spanish Cabinet and Senate for better terms, and attempted to establish a reciprocity arrangement, by which the light Spanish wines of Castile should be admitted to the United States on a light duty, in exchange for the lowering of the duty by Spain on American flour into Cuba. Although the negotiations did not reach any definite conclusion, Mr. Perry, in a note to Dr. Bowditch, thus speaks of the subject as bearing upon the matter under discussion:

"In my communications to Washington on this subject, I remember to have urged the same argument stated in your letter—that the introduction of cheap and sound wines into our country would be a sanitary measure for the health of our people, and would tend to diminish the vice of drunkenness. I trust it will be so to some extent and after some time. But I greatly fear that the vitiated taste of our people, accustomed to whisky and rum, and other strong alcoholic drinks, would reject the pure juice of the grape as insipid or less agreeable to them. If they did not like cheap wines they would not drink them, and it might be found to result, in practice, that no people can be expected to confine itself to drinking cheap wines except it produces them. I suppose that, if we ever come to produce them, we shall drink them also, and the taste for them will grow into our national habit, whilst the taste for rum and whisky will grow out and decline."

The consensus of opinion of those who have observed people who grow the vine or who had a taste for light wines, as well as where governments granted facilities for their introduction and use where they were not indigenous to the soil or climate, seems to tend to the same conclusion—that wherever light wines and beers are in use, there temperance prevails and intemperance and drunkenness vanish. Even Thomas Jefferson, a name inseparable from all that is or should be American, the framer of the Declaration of Independence, and one well fitted and capable of passing mature judgment, as he was not only a warm-hearted philanthropist, but also a keen and most intelligent statesman—and who could judge from a broad, comparative, practical experience, having spent considerable time abroad, where he had carefully studied the

habits of people—wrote as follows to M. de Neuville, under date of December 13, 1818:

"I rejoice as a moralist at the prospect of a reduction of the duties on wine by our national legislation. It is an error to view a tax on that liquor as a tax only on the rich. It is a prohibition of its use to the middling classes of our citizens and a condemnation of them to the poison of whisky, which is desolating their homes. No nation is drunken where wine is cheap, none sober where the dearness of wine substitutes ardent spirits as the common beverage. It is in truth the only antidote to the bane of whisky. Fix but the duty at the rate of other merchandise, and we can drink wine here as cheap as we can drink grog, and who will not prefer it? Its extended use will carry health and comfort to a much enlarged circle. Every one in easy circumstances, as the bulk of our citizens are, will prefer it to the poison to which they are now driven by ardent spirits. Our merchants know nothing of the infinite variety of cheap and good wines to be had in Europe, and particularly in France, Italy, and in the Grecian islands, as they know little of the variety of excellent manufactures and comforts to be had anywhere out of England. But why, I ask, should we rest on foreign importation? The vine grows indigenously from far up in Canada down to the Gulf of Mexico, and from the Atlantic to the Pacific coast. Scandinavian adventurers coasting along New England shores centuries ago, found the vine in such profusion that they called it 'The good vineland.' Vines grew freely on our hills when New England was first settled."

Mr. E. H. Faucon, of Milton Hill, in answer to inquiries made to him by Dr. Bowditch, answered as follows:

"So far as my experience—and I may safely say I have been no small traveler—goes, I am decidedly of the opinion that where light ales are used, intemperance is a minimum quantity compared to those countries where are used rum, whisky, brandy, Madeira, and Sherry, and in fact where any kinds of liquor in which the percentage of alcohol is large are drunk. I wish to call your attention to the islands of Porto Rico and Cuba, both of them islands of importance, and where the number of inhabitants is very large. Drunkenness in these islands is very rare, but the use of wine is universal. The Spanish government, wisely, I think, permits the free importation of the wine of Spain into those islands; and they are so cheap, costing the consumer for the common kind about five cents a bottle, and considered so wholesome, that they are used by the poorest classes. Even the caleseros,* exposed both night and day, through sun and rain and late hours, use them freely at their meals, I believe, with good effects. I never saw a calesero drunk or any the worse for his drinking."

Wise governmental action is therefore quite an important factor in the dietetic and bibulous habits of a nation, as a government, through its wise or unwise action, can often be held directly responsible for the character of liquor drank and for certain phases of national over-indulgences that lead to ruined health or to drunkenness. It would almost seem incredible that the creation of the famed "two- or three-bottle men"—the good, round-bellied and apoplectic complexioned, choleric, and stumpy-legged country English gentlemen, who furnished the

*The calesero is the Cuban coachman and the Havana cabby. One who has never resided in the Tropics can form no idea of the chilly sensations that accompany three or four degrees of fall of temperature in those latitudes; sensations that would drive an American or a Briton to the immediate aid of the brandy bottle to reëstablish a body equilibrium and resistance.

original for the figure of a typical "John Bull" to the caricaturists of England—men who were noted and honored in accordance with the number of bottles of heavy Port wine they could regularly individually imbibe after dinner, before giving up or falling into a sound sleep, or walking off into the outer air to work off the effects, was the direct result of Parliamentary action. It would really seem as if the men entrusted with the care of a nation would be broad-minded and intelligent enough to avoid anything that would entail any such injurious actions upon their constituency.

Such was the case, however, and England's famed "two- and four-bottle men"—possibilities then only existing, as observed by Grant Allen, as a result of a long epoch of health, due to light beer and light wine drinking, but whose stock of reserve health has long since been exhausted by an indulgence and intemperance that was permitted only by a long accumulation of gradually increasing health and resisting constitutions—and the gay roisterers, whose chief occupation, as so well described by Judge Barrington, was to drink themselves so stoneblind drunk that the attendance of a personal valet to extricate his vanquished lord out from the mixture of bodies, arms, and legs that daily encumbered the banqueting hall floor, was as much of a necessity as was the attendance of a stout squire on a knight in the days of good and brave Henry V—days of strife and of pot-metal armor—to extricate and put the fallen knight upright on his feet in case of being downed—men who then drank themselves into oblivious irresponsibility, and but too often awoke to find themselves marching to the field of honor, like poor Winkle of the Pickwick Club, to be slaughtered by fierce and gore-thirsty Dr. Slammers, while in the flower of their youth or in their prime, or, if more fortunate so as to kill their opponents, then to go on demolishing their two, four, or more bottles of heavy-bodied Port, until apoplexy, gouty degeneration, dropsy, or an exhausted patrimony and a debtor's prison, took them, either figuratively or practically, out of this busy and wicked world, were all the actual creation of a thick-headed Parliament.

How all this came about is most interesting. It is a long and halting story, but none the less interesting for all that. We all know what fine connoisseurs of wine the old Romans were. Well, along about the time that Julius Cæsar sent his celebrated laconic message to the Senate at Rome, announcing his arrival in London—a message, by the way, which was so well thought of that it has been many times copied; even Oliver Perry, of Lake Erie fame, is known to have been a great admirer of that dispatch, and is confidently believed to have won the battle of that name solely that he might place himself on record alongside of Julius in sending a like message to his Congress—many Roman gentlemen had to go over to England to help manage the affairs of the island, and look after the natives. They built villas, and in the mild climates and rich soils of their new possessions they reproduced the beautiful gardens and luxuriant homes of the Roman suburbs. They planted the vine and made wine, and Gallo-Roman merchants stocked the newly constructed Roman-British cellars with the light dinner and heavy dessert wines of France and Italy, a procedure which enabled the conquerors to get along peaceably and most harmoniously with their new provincials, whom they gradually civilized and inducted into the good habit of drinking light Claret wine and light Moselle with their dinners—habits that were kept up with great benefit until the Puritanization of England.

The good Romans remained in the islands for some four hundred and fifty years, by which time they had got the Britons into tolerably good habits; but were they to return to-day and see how barbarously their pupils have since relapsed they would no doubt be greatly shocked. Having taught the Britons how to make wine, the Britons continued to grow the vine and to make and drink wine, a performance which went on for many generations, as we learn that jolly Jack Falstaff, in addition to being well capon-lined, was also well soaked in sac—a wine similar to our Napa and Sonoma Hoch—which seems to have found favor with all the good palates and long and appreciative gullets of that healthful period. Then, unfortunately for England, came the long and devastating civil wars and the Puritan revolution—the latter an event which is made a great deal of by Hamerton as having totally changed the British character, thought, and general way of acting, so as to make them entirely different from anything on the continent—which greatly destroyed the vineyards, and finally ended by uprooting most of the vines that had escaped destruction, and making “blue ribbon” societies an absolute necessity. The good habits inculcated by the Romans could not, however, be entirely abolished, and Kent and its hops, and enterprising merchants importing light wines, continued to supply the bulk of the unpuritaned population with their favorite beverages, which greatly assisted in maintaining the nation temperate and the populace in exuberant health and a cheerful state of mind.

In the reign of good Queen Anne, however, there came a change over poor England that was far worse than the witch-burnings and other legacies that had been entailed by narrow religious and ethical views. The cause of this great moral, mental, and physical change in the ethics, blood, psychology, and constitution of the unsuspecting Britisher, was the signing of the treaty of Methuen, in 1703, through whose provisions the light wines of France were practically excluded from England; the effect of this treaty being to open the ports of England to the heavy and alcoholic wines of Portugal as a direct discrimination against France. Enmity against France and an unreasoning and bite-your-nose-off-to spite-your-face sort of patriotism now made the English take a special pride in drinking Port, and from that date began the decline of the use of light wines by the English, and the substitution of the heavy and strongly alcoholic wines of Portugal as the British national beverage; and, for nearly one hundred and thirty years England drank Port wine at her dinners, as the restrictions on light or any other French wines were not removed until 1831.

The intelligent part of the British nation was not wholly blind, however, to the bad results that would follow this injudicious and vicious Parliamentary move, as we are told by Gladstone that the University of Oxford, foreseeing the inevitable evils that would follow the limitations on the importation of light foreign wines—Portugal, owing to soil peculiarities, cannot produce a light wine any more than can the island of Sicily, or some of the heavy sweet grapes now grown in some of the soils of California—of French growth, as well as that it would accustom the nation to stronger and therefore injurious drinking, strongly petitioned and urged upon Parliament the sociological and moral necessity of at once removing the restrictions on the light French wines. All remonstrances were, however, in vain; British patriotism prevailed, and the heavy duties imposed upon the light wines of France, which amounted to their exclusion, went into effect. As remarked by Macau-

lay, the sudden displacement of the French light wines brought about an immediate and very visible injurious change in the customs of the British people. Unable to suddenly accustom themselves to the taste or use of the heavier peninsular wines, which were also much dearer in price, the populace betook themselves to the use of diluted gin—punches made of gin and of rum and other spirits which were cheaper. Families formerly accustomed to light wines at their meals, or accustomed to dispense these as a part of their sociability and hospitality, now were obliged to resort to the use of the various stronger liquors and spirits, with such results to the morality of the nation that their effects were plainly visible all over the land—notably in the increase of crimes.

The injury done to England by these one hundred and thirty-one years of wrong education and enforced wrong customs can hardly be realized. It is this that, in a large sense, is at the bottom of the present declining epoch of British health, when contrasted with the epochs of the rugged health, adamantine livers, and salamander-like stomachs and kidneys which had been bequeathed to the hardy and bluff generations that had furnished the “two- or four-bottle gentlemen,” by the successive former generations that had been reared on the light beers and wines. Not alone were, in the end, the stout-kidneyed gentry vanquished, but the results of the Methuen treaty have left poor England such an inheritance of taste for strong drink and so much inherited gout, rheumatics, debilitated livers and kidneys, and so much inebriety, and moral, mental, and physical wreckage, that it will take whole generations of temperate light-wine drinking to bring back the bluff old islanders or their descendants to their former rugged moral, mental, and physical health.

To one accustomed to take a birdseye view of pathological changes, whether they be of tastes, morals, or in the tissue, the result of this long upward rise in subjecting the system to the steady effects of increasing alcoholization is something fraught with the most disastrous outlook. Tissue becomes accustomed to the steady poisonings, whether these be from the effects of a continued foul air, or from strychnia, arsenic, opium, alcohol, or any other drug that is partaken of in poisonous or sensible doses. The steady dweller in and breather of a highly impure air, contaminated with the exhalations of many lungs, becomes accustomed to a species of intoxication that makes pure air, which is otherwise exhilarating, perfectly insipid; insipid to an extent that many a poor wretch is in misery unless immersed in an atmosphere so foul that one accustomed to a pure air could not exist in it for ten minutes without experiencing symptoms of suffocation or of approaching headache and nausea.

Intoxication is, after all, only a matter of degrees and of kind, rather than a condition due to any one particular or simple article, and wines and beers are, in this respect and in the matter of degree, intoxicants or exhilarating mediums comparable to the effects experienced by variously constituted airs. Some persons may smile at this comparison and consider it very far-fetched, but when we seriously consider that, from a great concentration of animal emanation, the air of a room may be as intensely intoxicant and brutalizing as the effects derived from any of the most adulterated and vile of spirituous liquors, the analogy will not seem so very distant. As an evidence I have but to refer to the experience of the poor Englishmen who were confined in the Black Hole during the first Indian mutiny of 1757. The relation given by Dr. Holwell, one of the sur- most graphic recital of the grow-

ing intoxication and frenzy that took possession of the men while laboring under the influence of that aerial poison, or intoxicant generated from over-respired air; whilst upon himself the gradually increasing effects leaving him after several hours still conscious, are described as leaving him "sensible of no pain and of but little uneasiness, with a stupor coming on apace, in which condition I laid me down to die in peace, and gradually became unconscious."

In a paper presented to the Charleston meeting of the American Public Health Association, in 1890, and published in the XVIth volume of the transactions of that association, I dwelt at length upon the evil effects of impure air, and pointed out its results in inducing a criminal tendency, its proneness to lead to inebriety or chronic drunkenness, and its actions as a general demoralizing agent through the peculiar nature of its poisonous and intoxicating properties. In the course of that paper I wrote as follows:

"A reviewer of Acton's work on prostitution mentions the swarms of child prostitutes that infest the low quarters of London, whose existence he attributes to 'a brutal stupefaction of the moral sense, resulting from an utter ignorance of what is good or evil.' Were I to review the reviewer, I might ask how ignorance alone can cause brutal stupefaction of the senses, either morally or otherwise? In the present age, we fully understand that for all effects there must be a specific, self-sufficient cause. It may not be found at once, but we should neither jump at a conclusion nor cover over our ignorance in the matter by mere figures of speech. Simply saying that their mothers drank alcoholic liquors, and that precept and example have lowered and debased them, even if they are too young to have drank themselves, does not satisfactorily explain the existence of a swarm of child prostitutes, or how they arrive at the stupefaction of the moral senses. My own opinion is, that on alcohol we lay the blame so that we may not blame ourselves for the indifference and neglect of the helpless and lowly of the human family in our neighborhood; it is a certain relief to the conscience to say that they drink—drink has brought it all upon them; we then wash our hands, like Pontius Pilate, and the Passion Play goes on. Drink, however, does aggravate and precipitate many conditions that the poor have in them with a strong inherent tendency," and the tendency finds its origin in their foul-air-poisoned tissues.

The question has often occurred to me, while looking on these helpless children, Is it possible that the philanthropists, statesmen, and moralists are unacquainted with the evil effects of foul air on the tissues and organizations of the young, and through these, on their moral and psychological natures—effects really more potent than those arising from ordinary thermometric differences, or from mere ordinary changes of diet or of drink? That an air whose quality has become so changed that it will give an ordinary gentleman, accustomed to well-aired rooms and to fresh air, feelings of nausea or an inveterate and lasting headache, or even produce in such a man a serious illness, must be poisonous, no one will question or doubt. Such an air has precisely the same effect on the tissues and organization of the young that would be produced by the continued administration of poisonous doses of alcohol or of fusel oil, and the slow, steady effect of this on the nervous system of the susceptible child is to create a morbid irritability, which, sooner or later in life, will call for alcoholic support or stimulation, and make of them, as adults, constitutional drunkards. The little bodies of these poor

children have no more resistance, strength, or endurance than their poor and helplessly drifting little brains are capable of discerning virtue from vice or good from evil as a result of the toxic stupefaction that has slowly but increasingly possessed them; they have become morbidly sensitive in a physical sense, they age early, want has developed a precocious sharpness of instinct, and the foul air that has poisoned their young blood has precociously matured their sexual organs, while the rest of their physique, as well as their moral and mental natures, all lack development—a sad condition of early wreckage, that finds sufficient cause for existence in a foul and vitiated atmosphere without any assistance from any alcoholic drink.

I have purposely dwelt at length upon this generally overlooked but indisputable, as well as most prolific, cause of inebriety, insanity, immorality, and crime among the poorer classes, as, although a most fruitful source of all manner of degeneration, it is a pathway of investigation hardly ever trod by the apostles of temperance—apostles who, while struggling against the use of light wines simply because they are wines, but which are harmless, remain blind to the great nursery of physical and spiritual degeneration contained in the foul air of many of our tenements and dwellings, where the body becomes so irritably constituted that it must, in the end, resort to alcoholic stimulants for maintenance and support. Another phase of this subject which I wish to illustrate by the above explanations, is that light wines bear in a certain relative sense the same position in regard to heavy wines or spirits that light mountain air bears in its exhilarating qualities to the deadening and stupefying atmosphere of some crowded or ill-ventilated room or den. It is not all, as previously remarked, a simple question of an agent, whether it be a wine or an air, which should occupy our attention, but rather the question of the kind and degree, as the quality of the air continually breathed may have a more actually demoralizing and degenerative effect in proportion to the age of the person, his antecedents, and the length of time it is breathed, in connection with the surroundings and occupation, than any like effects that could possibly be produced by light wines. Then, again, while the latter have been proven to be positively beneficial to the cause of temperance, the former, or foul-air, inebriety factor, can only result in the most serious damage.

From all the foregoing it will be perceived that temperance does not by any means depend on total abstinence. Not but that the total abstainer is himself, while abstaining, fully and to all intents and purposes the pattern and mirror of the most abstemious temperance; but we must not forget that either the exigencies of his position, class, and mode of labor, habitation, nature and variety of food on which he may have to live or to which he has access, as well as various and varying physical conditions due to inheritance, environment, or occupation, may make his life and condition ever so much the better by the daily use of a little light wine. Not only may this little light wine make his general condition the better, but its absence may, by the demands for stimulants thus created, even be the foundation for the beginning of a long life of intemperate dissipation, ruining him and his family, either physically or morally, for all time to come. It is easy enough to philosophize and to preach ethical conduct, but the poor wretch who, through some means or other, places himself, or is so placed by circumstances, that he needs must, sooner or later, ~~apply to alcohol~~ for support, is, when that time comes, dead to all phil^{osophy} or to any moral or ethical, as

well as to any physiological, lecture. He is then as unreasoning and as impatient of restraint and of deprivation as many of the good-intentioned people at the opposite end of the line, who are unreasoning and impatient in seeing that he cannot and shall not procure his much-needed alcoholic stimulant.

Besides all this, as we have already mentioned, alcoholic inebriety is but a small fraction of the total sum of inebriety—inebriety of various degrees and forms, from that of opium and all classes of narcotics to that caused by tea—that floods the land. The late enervating and wrecking grippe epidemic of several years' duration has largely added to the list and numbers of the nervous wrecks who must fly to some support or other to be able to navigate. It has greatly augmented the cases of American nervousness. Many of these latter will probably leave alcohol or any liquor quite alone, but will choose from the long list of narcotics, soporifics, or from the coal derivatives, such as phenacetine or antipyrine, or the many hypnotics, some one antidote or drug that will give them the much required and absolutely needed bracing and rest. The drug-stores are yearly dispensing an ever increasing amount of these drugs—all good enough for temporary or actually needed but intelligent use—that are fast becoming the destructives of American life, and which, as has been said, are far more extensively used than alcohol. A light wine, by increasing the power and properties of ordinary foods to nourish the system, by creating a better feeling, and by dispelling that brooding apathy, despondency, and settled melancholy which seizes too many of us, is the proper and exhilarating remedy against these evils. Its use will prevent the many from resorting to the great variety of drugs, nervines, and bitters which are advertised for tonics, but which are in the end nothing but treacherous stays to a broken-down man; they are very poor whiskies with some aromatic herbs for flavoring in case of the bitters or medicated wines, and, if steadily used, through their high percentage and quality of alcohol, serve but to initiate their takers into a state of sure but slowly growing and unconscious inebriety.

It is a mistake to imagine that one is free from the dangers of inebriety simply because he or she may be able to "walk a chalk line" or deceive their friends as to their being in the habit of using any stimulants or drug. The secret drinker or drug-taker is the one who runs the greatest risks. We need more manliness and less hypocrisy, more honesty and less cant, if we ever hope to become a sober and temperate nation, healthy in physique as well as in morals. We need less demagogism and more manly statesmanship, less catering to popular or sectarian blind prejudice and arbitrary demands, and more open and honest expression of sentiments. We want to strive more after the substance and less after mere names and mere shadows, and that which we need the most is a more sensible and practical education, one that will enable us to look at things in their true light as well as enable us to know a criminal because he is such, rather than to believe a man is such because he has the odor of a rum omelette.*

In this connection I might add that the peculiarly private nature of the American saloon, its high screen-doors, its high bar, and the rapid drinking, as well as the nature of the strong drinks sold over the bars,

*While the factorial influence of alcohol as a crime-producer is an undisputed and patent fact, it is also a fact that much more crime is attributed to alcoholic inebriety than properly belongs to it. In 1893, out of a total of 4,436 suicides, 1,913 were due to

and the sportive and too loud character of the persons who run many of those institutions, bear about the same origin and relation to American sociology and nationality that the Hebrews enjoyed in Europe prior to their political emancipation through the broad-minded action of Napoleon. The Jewish race could not follow any of the usual industrial or commercial occupations wherein their fellow-citizens made their livelihood. They were restricted to pawnbroking and money-lending, and formed no integral part of the business, industrial, military, or social life of the nation. The adoption of the French, Spanish, or Italian café, or even the German beer-garden, with its cheerful vaudeville performances and the music of the Fatherland, would do away with our much despised and very peculiar saloon, whose proprietor and attendants are driven to the exclusive privilege of discussing horseraces, prize-fightings, chicken-fights, gambling, and the relative merits existing between various houses of ill-repute, and other like elevating subjects, of which the proprietor or lady cashiers to the café of southern Europe are as ignorant as an Esquimaux is of the ethics of Emperor William's court receptions. That the saloon is run so secretly that it dispenses liquors which must be gulped down as if they were some horrid medicine, and that it sells only such fiery liquids instead of light wines or beers, which are only sipped or slowly drank during conversation, and that the saloon man is not considered a mentor or a desirable shepherd for either the young, the middle-aged, or the old, or the single or the married, are all conditions that are but the logical and natural outcome of the position to which we have ascribed it.

We must dispense with some of our Pecksniffianism and be more natural. We are a great bundle of inconsistencies in the matter of the saloon, as we are in other social and ethical matters, and are too unwilling to take a middle-of-the-road or a conservative course. We are forever rushing to some extreme compulsory methods to force ourselves to some other extreme, just as we legislate against prize-fights for moral appearances, and then wish the law that prevents a genuine old Roman boxing match was in Halifax.

In my opinion, saloon licenses are issued altogether too indiscriminately. Continued carousals and drunkenness exercised in any saloon should be cause for revoking its license at once, and only a certain percentage of saloons should be permitted to a given number of the population. Resorts, places of amusement, and gardens of a public nature and for recreative purposes, should not be permitted to sell liquors with alcohol above a certain percentage, and a *bar* should not be licensed on any account, in any such public places. Every encouragement should be given, on the other hand, to the establishment of the European café, with its tables and chairs, its coffee, its light beers and light wines. We blame the foreign emigrant from the wine countries for much of our drunkenness; whereas, on the contrary, by making him give up his harmless habits and causing him to adopt our own, we have but too often made him into a dissipated wretch. It has been a grievous mistake on our part not to have realized the harmless nature of the drinking

pure despondency, and only 297 to the effects of alcohol; and out of 6,615 murders, only 713 were attributable to the same cause. In 1890, out of 7,836 murders, 1,282 were committed by total abstainers, and 1,267 by drunkards. It is a noteworthy fact, one well recognized by criminologists, that toward the equator crimes due to intemperance are practically unknown. Much that we blindly ascribe to alcohol is really due to climatic or seasonal causes.

indulged in by the German and the French—although the latter, by his comparatively small numbers, could hardly be said to enter into our life as does the German—and ever allowed our national habit in this regard either to mingle with or supplant their customs. They should always have been kept scrupulously apart. By doing so we would have retained and possibly even been able to adopt their customs.

Our habit of confounding all drinking, as well as all classes of light wines and beers, with all kinds of highly spirituous liquors in one great mixed confusion, has here been a source of indescribable injury, and with endless bad results. Like to the English lady, described by Hamerton, who objected to a guest beguiling the dull Sunday hours by violin playing, and who, although told that the music was one of Handel's sacred pieces, retorted that, notwithstanding the music might possibly be sacred, the instrument played upon, being a violin, was certainly anything but a sacred instrument, and therefore she would most certainly ask the gentleman to desist from any further music practice on that day, we have too much overlooked the fact that light beers and light wines can be drank with moderation and with as innocent results as would have followed a masterly execution of an oratorio on the violin. But for this indiscriminate commingling of that which is innocent with that which is brutal or vile, we might have had a better control of the liquor traffic by the establishment of graduated systems of licensing. For example, beer halls, exclusively devoted to the sale of a beer of a specified strength, should be exempt from any license, and if insisting on the dispensation of strong alcoholic liquors, then a *heavy* license should be imposed, just as it should be on all places where strong liquors are sold.

Too many of our good people, wrongly educated, have been terribly afraid of making any compromise with what they erroneously consider a wrong, by admitting that there is a wide difference between drinkers and drinkers, as well as between the various kinds of drink employed—differences which exist and are as widely apart as a diet of skimmed milk from one of corned beef, cabbage, and apple dumplings—and by insisting on seeing a criminal wrong in places and in the use of articles which are considered as right and proper by the majority of the inhabitants of the civilized world. Any attempts at reaching any sensible plan of emancipating our people from the evils of strong drink or intemperance have always proved, as they will always continue to prove, if attempted on like lines, abortive.

Like to the Moslem of old, who gave the world the choice of the Koran or the sword, the prohibitionist only gives the world a choice between total abstinence and a national inebriety that knows neither limit nor ending. This is all wrong, and a sensible view of the case need not necessarily carry with it the idea of any compromise with any wrongdoing. We, here, would look upon a man whose breath indicated that he had partaken of a little claret with his dinner as one doomed to perdition, or capable or liable to commit any crime in the category at a moment's notice, while we overlook the fact that in no country is drunkenness more of a social crime than in countries where wines and beers are the common beverages of the population, and where, to have it known or intimated that one was drunk, would be at once to lose all social or business standing. That drunkenness, or being at times under the influence of liquor, does not convey the same penalties with us, is but too well known, as it is equally well known that we recklessly con-

found the most temperate use of wine with the most debauched habits. By our dictum we have allied all liberal-minded men—even some who are total abstainers from taste, but not from any sectarian principle or prejudice—with the very temperate, the moderate and immoderate drinkers and drunkards, as well as with all the saloon element and the sporting and fast world, with the demi-monde included, in a grand mass, against which we have necessarily waged a most hopeless war in the cause of the impossible condition of prohibition.

Our only hopes are in a rational campaign devoted to the cause of temperance, and when we shall well understand this, we shall then have made a step in the right direction and toward a visible end; and until we learn that it is for temperance, and not for prohibition, that we must strive, and until we can by these means unite all right-thinking people on a common plane, one from which no intelligent person will dissent—no man or woman living will, in their sober moments, no matter how depraved they may otherwise be, countenance or approve of drunkenness, while the major part of the prohibitionists seem to affect to believe that every one opposed to their views favors the most unlimited debauchery—we must expect matters to grow from bad to worse, and that not only prohibition will not prevail, but even the cause of temperance will continually lose ground.

I cannot close this report better than by quoting from Dr. Bowditch's voluminous report presented to the Massachusetts Legislature, in 1871, on the use and abuse of intoxicating liquors and the means proper to remedy the evil results: "While stimulants are universally used and abused by either savage or civilized man, and while this love for stimulation is really one of the strongest of human instincts, and is, by its nature, indestructible, it may be regulated by reason, by conscience and education, or by law, when it encroaches upon the rights of others. Light liquors, such as light wines and beers, should not be classed with ardent spirits, either as to their effects upon man or in the manner of regulating their sale. Ales, beers, or wines, with only 4% or 6% of alcohol, do not intoxicate, and should never be classed with intoxicants. Foreigners, with temperate and harmless tastes, should be encouraged, rather than discouraged, to continue in the exercise of their home customs, while, on the other hand, we should encourage our own people to give up their extreme tastes and habits for strong liquor, and we should favor their adopting the temperate habits and customs of the German or of the Frenchman. The drunkard should be restrained, and very stringent laws enacted looking toward his suppression or cure, as his acts and presence are a continued menace, as well as a continued source of discomfort, to the peace of mind and of body, as well as the rights of others. Acknowledged dipsomaniacs should be confined in an asylum for a long period for the purpose of attempting their cure; the confinement being in State institutions, and the commitment should not be for less than two years."

In conclusion, I would also state that the United States do not present the climatic causes for a like degree of inebriety as is observed in the more northern European nations. Our degree of inebriety is therefore altogether unnatural, as well as uncalled for as an existence, and with the example set by California, it is hoped that, in time, inebriety will have been greatly weeded out from many of our States, as the remedy lies in our own cheap wines and cheaper beers, with an education that will lead to their use.

CONSUMPTION (PULMONARY TUBERCULOSIS).

ITS RESTRICTION AND PREVENTION.

(Circular No. 5, Preventive Disease Series.)

The disease commonly known as consumption is the softening period of tubercle of the lungs. Tuberculosis may affect not only the lungs, but the glands of the neck, the kidneys, the spleen, the intestinal glands, the large joints, the membranes of the brain, and other organs of the body; but it is with tuberculosis of the lungs, which is known as consumption, that this circular is intended to treat.

About one seventh of all the deaths in the United States are due to tuberculosis in some form, by far the greater number being from tubercle of the lungs, known as consumption.

Cause of Consumption.—Tuberculosis is produced by the entrance into the body of the germ of the disease, known as the *Bacillus tuberculosis*. This may reach the system in dust-like particles of consumption sputa, or it may enter the system on particles of food, possibly in water and milk. The most common method is the inhalation of dust-like particles of the spittle of persons who suffer from consumption of the lungs.

A consumptive person occupying a room, and being careless with the expectoration, spitting on the floor or on the sides of the walls of the room, is a fruitful source of danger. The sputum becomes dry and friable, and separates into dust-like particles, like motes in the air, conveying germs (which by drying have not lost their life) into the lungs of those who live in the same house.

Predisposition of Persons to Consumption.—Many people believe that consumption is inherited, but the closest investigation has shown that it is not inherited, that only the susceptibility or liability to the disease is inherited. Thus the children of a tubercular family do not necessarily inherit the disease itself, but they inherit the constitution, which, when exposed to the germ, furnishes a soil which propagates the disease with great rapidity, and one after the other succumb. Again, one member of the family, the father or the mother, for instance, may suffer from a slow form of consumption, due to an involvement, perhaps, of but a small portion of the lungs. By careless expectoration they may infect their children, who, being susceptible, will die one after the other, while the parents may continue to live.

A not infrequent manner for the germ of consumption to reach the system, is through the milk of tubercular cows. The milk from a cow that coughs or appears mangy and will not fatten should always be viewed with suspicion. It is better to scald all the milk used in the family. It is safer always to use milk from healthy-looking cows only, and families should refuse to purchase milk from dairies that do not keep their animals in a clean, healthy condition.

The use of tuberculous milk, whether from tuberculous cows or from

nursing a consumptive mother, is most dangerous when the child has small ulcers, commonly called canker sores, in the mouth, and during the teething period. At such times the bacilli may enter the lining of the mouth and penetrate to the glands under the jaw and of the neck, resulting in swollen and suppurating glands, which gradually extend and break through the tissues, and are commonly called scrofulous ulcers of the neck, leaving unsightly scars that last during life. These glands in the neck are connected by small vessels, and one after the other break down and suppurate. They extend down toward the apex of the lungs, and in that way reach the pulmonary tissue and result in infecting the lungs with the germs of consumption.

The breath of a consumptive person is not necessarily dangerous, as the germ is conveyed largely through the expectorated matter, which swarms with bacilli. Still, the expulsive effort to cough may act as an atomizer, and for a moment throw germs into the air; but these being moist attach themselves to whatever they come in contact with, and are not liable to be dangerous to others until they become detached as dried particles and capable of floating in the air.

Self-Infection.—A person swallowing the germs of tuberculosis is liable to self-infection; in other words, to add to his disease by swallowing his sputum. He may suffer from consumption of the lungs, from which it is not impossible for him to recover; but by carelessly breathing the germs which he has expectorated, he may infect portions of his lungs that are still sound, or he may, by swallowing the germs, cause tuberculosis of the bowels, intestinal glands, or other abdominal viscera.

Contagion and Infection.—When we speak of consumption as being contagious or infectious, we do not mean it in the same sense as small-pox, scarlatina, or measles, for it is possible to live alongside and with a consumptive person without acquiring the disease, if the proper precautions be taken to dispose of the sputa. Nevertheless, we know that persons suffering from this disease are frequently very careless with their expectoration. This makes the habitations of such persons dangerous to others, and in the restriction and prevention of the spread of consumption we must render the sputum innocuous, by depriving the germs of life.

Prevention of Consumption.—In order to prevent infection from consumption, discharges from tuberculous patients should be destroyed before they become dry. All sputa should be expectorated on pieces of cloth and burned, or into cups containing a five per cent solution of carbolic acid. If the expectoration be into a handkerchief or napkin, the article should be placed in boiling water for fifteen minutes before it can be considered safe to use again.

All receptacles used in receiving expectoration should be rinsed in boiling water. It is better to expectorate upon pieces of old cotton or linen cloth and burn them.

Cups of waxed or oiled paper should be invented, to be carried in nests, and sold at a moderate price, so that they may be burned after use. These might contain prepared cotton to absorb the secretion and kill the germs. Such receptacles should be used when traveling by rail or steamboat.

Unless more care be taken on the part of persons having consumption,

it will be found necessary to place legal restriction upon their migrations from one place to another. The promiscuous expectoration, by such persons, on the floors of cars, between the seats, on hotel floors, on sidewalks, and in public places generally, renders them not only a nuisance, on account of the unclean habit, but a nuisance that is dangerous to the public health, as liable to infect others. The expectoration is none the less filthy and dangerous because it is an inexorable accompaniment of a hopeless disease.

Hygiene of the Room Where Consumptives Sleep.—Carpets, in houses occupied by consumptive patients, are almost certain to become lodging places for tubercular bacilli. It is better to place on the floor rugs which are not fastened down, so that they may be frequently taken out of doors and exposed to the sun and air. Neither the floor nor the rugs should be swept when dry. Dust on the furniture should be removed by wiping with a damp cloth, and the cloth should be burned at once, or thoroughly boiled before drying.

Body and bed linen should always be boiled in the process of washing. The room of the patient should be large and sunny, and the surface of the walls smooth, so that dust will not become attached. The curtains should be of some fabric which can be washed in boiling water. The floor should be waxed or covered with oil cloth or linoleum, and, as stated before, better to have mats that can be taken out of doors than to have carpets.

Well persons should not sleep in a room recently occupied by a consumptive; in fact, they should not occupy such a room at all until it is disinfected by washing the side walls, doors, and all woodwork, including furniture, with soap and water and then with a solution of one to a thousand of corrosive sublimate; even dishes, knives, forks, and spoons used by consumptives should be scalded before being used.

In some cities the local Board of Health undertakes to disinfect, free of charge, rooms which have been occupied by consumptive patients, when requested to do so.

Precautions to be Taken by Those Who Are Predisposed to Consumption.—

1. Do not live in a damp locality, in a damp house, nor in a house with damp, foul cellar or surroundings.
2. Do not live in a house with defective plumbing or bad drainage.
3. Do not frequent crowded or badly ventilated assembly rooms, nor sleep in close apartments.
4. Adopt an out-of-doors occupation, so as to live in the open air.
5. Avoid as much as possible everything that tends to depress; all excesses should be avoided; and keep free from anxiety and mental and physical overwork.

These causes, by placing the system below par, render the persons less capable of resisting the disease (if exposed to the germs), in such a way as to bring about the development of consumption.

Hospital Rooms in Boarding-Houses and Hotels.—Boarding-houses, hotels, and sanitarium in salubrious regions where consumptives are accustomed to gather for the benefit of locality and pure air, should be provided with rooms especially set apart for the use of consumptive patients. These rooms should possess all the necessary equipments of a hospital; they should not only be well ventilated with light, sun, and air, but the

woodwork should be such as to be readily cleansed. There should be a total absence of hangings and draperies; the walls, if papered, should be with glazed paper and varnished, so as to be washed. The floor should be filled with wax or paraffine, and the bedstead metallic. The conveniences of baths and closets should be modern. Scrupulous cleanliness should be observed.

Such rooms would be no more expensive than ordinarily furnished rooms, and would render the presence of consumptive persons free from danger to those who are in health.

All boarding-houses and hotels, as well as residences of the rich and well-to-do, should be provided with hospital rooms, so that if scarlatina, measles, diphtheria, or such like infectious diseases should break out in the house, it would not be necessary to remove the patient and separate families, to say nothing of the danger to such patient from enforced removal, and to others by exposure to the disease during the process of removal.

Recapitulation in Brief.—Consumption is caused by a germ called the *Bacillus tuberculosis*.

Consumption of the lungs is the softening process of a deposit of tubercules in the lungs.

Consumption is no longer believed to be hereditary, but it is believed that a tendency to acquire the disease is hereditary.

Breathing the germs or swallowing them in food or milk is the most common method of acquiring consumption.

The spittle of a consumptive is full of germs. When the spittle is dry the germs float in the air as little particles of dust, and, lodging in the respiratory passages, may take root, multiply, produce tuberculosis, finally consumption and death.

Do not use milk without boiling.

Do not use milk from cows that will not fatten.

Do not purchase milk from dairies that do not keep their animals in a clean, healthy condition.

Do not permit a consumptive to expectorate on the floor. Insist that cloths which may be burned be used to receive the expectoration.

Let all utensils which a consumptive may use for any purpose be scalded after use.

The Health Officer should invariably be notified of the presence of a consumptive in the house.

It would be better if the sputum of all suspected cases were subjected to a microscopic examination, to determine the presence or absence of the germ of consumption. If the germ be present, it is consumption; if the germ be not present, it is not consumption, but some other affection of the lungs, perhaps less dangerous.

Rooms recently occupied by a consumptive should be thoroughly disinfected before occupation by well persons. They should not only be disinfected, but should be thoroughly washed.

Floors of rooms occupied by consumptives should not be swept when dry.

Hotels, lodging-houses, and sanatoria generally, should be provided with hospital rooms for the use of persons afflicted with consumption or with acute contagious diseases.

The residences of wealthy people should always be supplied with rooms fully equipped to serve as hospital rooms.

Persons inheriting the liability to consumption should choose an out-of-doors occupation; should avoid excesses of all kinds; avoid damp habitations, over-exertion, and all depressing causes, mental and physical. They should, above all things, avoid the presence and habitations of persons afflicted with consumption.

Consumptives should, with all kindness, be remonstrated with by relations and friends, and gently though firmly admonished concerning their expectoration. They should be given to understand that public opinion will soon bring about a restriction of their liberty, unless they themselves voluntarily and intelligently exercise more care in disposing of their expectoration.

The danger is from the spittle of consumptive patients, from the milk of tuberculous cows, and from the flesh of tuberculous animals. We may guard against the tuberculous flesh and milk with comparative ease, but we cannot so easily escape from the minute atoms that float in the sunlight, and which carry the germs into our lungs, in the air we breathe.

The only way to restrict and prevent consumption is to destroy, at once and forever, the sputum of the sick; and kill all the tuberculous cattle or other animals. A tuberculous animal may cough on the grass, hay, or feed to be used by other animals, thus infecting a large percentage of a herd.

In conclusion, the State Board of Health would earnestly urge that whenever a patient has reached the second or third stage of consumption, indicated by a daily rise of fever, with night-sweats, copious expectoration of purulent matter, with perhaps swelling of the ankles, and diarrhoea, that it is not only folly, but criminal, to send him away for the benefit of climate. Let such patient have the comforts of home, if there be such comforts for the patient. Let him remain where he cannot spread the disease; and when he has passed away, let him be buried with little delay, or what would be far better, the body should be cremated, thus rendering it incapable of doing further injury.

The habit of travel that consumptive people have, tends more than all else to spread the disease, by making it possible to acquire it through an increased number of loci or points where it exists.

When the disease has reached the stage above described, the patient will surely die, and death is then a consummation devoutly to be wished, even by the patient; therefore, kindly and in all gentleness let him realize his condition, but firmly and unyieldingly insist that he shall not endanger those whom he loves best, by careless expectoration. Let him be instructed in this regard by his attending physician, by his friends, by his neighbors, and by the Health Officer, if necessary, until his coöperation and the coöperation of those who care for him, are secured beyond a question.

Until public opinion demands legal restriction of persons affected with consumption, the instruction and education of the public as to its infectious nature, and how to restrict it, are all that can be done.

Medical Treatment.—The medical treatment of patients afflicted with consumption should be left entirely to the attending physician. It is not in the province of preventive disease circulars to indicate the medical treatment of the sick. These rules are for the guidance and instruction of the people who have to care for the afflicted.

A STUDY OF MILK IN RELATION TO HEALTH AND DISEASE.

By GEORGE M. KOBER, M.D., of Fort Bidwell, California.

According to the United States census of 1890, the average annual production from 16,511,950 milch cows was 5,209,000,000 gallons of milk, 1,024,000,000 pounds of butter, and nearly 19,000,000 pounds of cheese; the average annual consumption per capita being 126 quarts of milk, 33 pounds of butter, and 16 pounds of cheese. These large quantities give an indication of the extent of milk consumption, of the danger from an impure supply, and of the temptation, from a monetary point of view, to the practice of fraudulent and more or less harmful adulterations.

The official or legal standard composition of milk varies somewhat in different States and cities. It is lowest in New York, New Jersey, and the District of Columbia, the requirements being 3% of fat and 9% of solids not fat; it is highest in Massachusetts, 3.7% of fat and 9.3% of solids not fat. But these standards do not prevent adulteration by unscrupulous dealers, and one of the most common frauds appears to be the removal of cream and the addition of just enough separated milk to make a mixture that will come within the limit of the standard.

Analyses of milk sold in New York City showed an average dilution with 33% of water, the fraud amounting to \$10,000 per day. The State Inspector for New York found an average of 12% of water added and 20% of cream removed.

According to Dr. Spiegelhalter, St. Louis, Mo., loses nearly \$2,000 daily by the removal of cream.

In the City of Chicago a bureau of milk inspection was created in 1892, and the milk-supply of the city has been improved materially thereby, yet in 1894, of the 12,093 samples examined, 4,320 were below the standard.

These facts indicate the desirability of stringent laws governing the milk traffic as a protection to the pocket of the consumer; but an analysis of the evidence presented in the following pages, together with the fact that milk constitutes one of the best culture media for disease germs, clearly shows that the dairies should be under sanitary control to prevent the propagation of disease by infected milk. This sanitary control should include inspection by competent veterinarians, so that the milk of all animals suffering from disease may be excluded from the supply. This is especially true of bovine tuberculosis, erysipelas, anthrax, pleuro-pneumonia, foot and mouth disease, septic and other fevers, specific enteritis and other intestinal disorders, rabies, tetanus, garget and other inflammatory conditions of the teats and udder.

The milk of animals five days before and five days after parturition is also unfit for human consumption. The cow stables should be separate from other stock and poultry yards; they should be spacious, well ventilated and lighted, with cemented floors, proper drainage, and clean hay

or straw for bedding. The animals should not be allowed to feed on pastures with stagnant water or noxious weeds, particularly euphorbiaceous and ranunculaceous plants, nor upon the swill or products from distilleries, breweries, glucose factories, etc. There is especial danger in allowing animals to wade in filth and polluted streams, or to feed in pastures where the grass reeks with sewage filth left upon it by the receding tides, because the germs of typhoid fever may cling to the udder and teats and thus contaminate the milk.

The water-supply should be ample and of a pure quality, and the feeding should be arranged to secure the best possible results as regards the health of the animals and excellence of the milk. An abundance of wholesome pasture in season, with hay and meal fodder, should be allowed.

The cows should be groomed daily and the teats and udders washed before milking with water previously boiled; and the requirements of cleanliness should apply with equal force to the milkmen, both in their persons and clothing.

All persons engaged in handling the milk should be free from disease. Milk should not be permitted to leave a farm or dairy during the existence of typhoid fever, diphtheria, or scarlet fever among the employes or inmates. Dr. S. C. Busey and the writer, in a report on morbid and infectious milk,¹ have recently tabulated no less than 240 such epidemics, all traceable to the milk-supply. Of these, 187 were reported by English, 31 by American, and 9 by Scandinavian observers; while 8 came from German, 3 from Australian, and 1 each from French and Swiss sources; and right here it is suggested that the infrequency of milk typhoid in France and Germany is due to the fact that milk is rarely used in its raw state on the Continent of Europe.

To prevent loss under the restrictions necessary during the prevalence of infectious disease on a farm, the utilization of the milk may be authorized for butter production after proper sterilization under the direction of the health board.

The milking should be done in a dust-free atmosphere—preferably on cemented floors previously sprinkled, in order to reduce the number of germs to a minimum.

It will be shown in subsequent pages that, no matter how great the care exercised, cow's milk is never free from ordinary bacteria, and the best way to prevent their proliferation, and consequent rapid souring of the milk, is to pasteurize it at the farm, by exposing it to a temperature of 170° Fahr., and then rapidly cooling it to a temperature of 45° Fahr., in which condition it ought to be delivered to the consumer. The bottles for delivery should be cleansed by steam or a boiling solution of caustic soda, with subsequent washing in sterilized water. They should be closed with patent stoppers, and properly labeled for specification of contents, whether "full" or "skimmed" milk, and for the identification of dealers. The retailer should be registered, and be required to furnish a list of customers; and the names of the latter should be arranged on the index-card system at the health office, so that the simultaneous occurrence of infectious diseases in families, supplied by the same dairy or dealer, may the more readily be discovered.

With these preliminary remarks on the necessity for sanitary control of dairies, the writer hopes that a perusal of the following pages will tend to lessen the dangers, diminish the sum total of human suffering,

and reduce the frightful infantile mortality now caused by contaminated milk.

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I. NORMAL MILK.

Milk is the secretion of the lacteal glands, and is an emulsion, *i. e.*, a fluid which holds fat globules in suspension, it also contains sugar, salts, and albuminoids; it is an opaque fluid, varying in color from bluish-white to yellowish-white. The milk globules are composed of neutral fats—the tri-glycerides of oleic, palmitic and stearic acids—and from 0.0015 to 0.009 mm. in diameter. The chief albuminoids in milk are *casein* (which varies from 2% to 4½%), *peptone* (from .08% to .1%), and *lactalbumen* (from .1% to .4%). The amount of the other albuminoids present in milk have not been determined. Casein is distinguished from them by being coagulated by acids and by rennet. The chemical nature of casein is not very clearly understood; it is believed to be similar to alkali-albumen, but differs in this, that casein is precipitated by rennet, while alkali-albumen is not. When milk is heated, the casein is not coagulated, but the other albuminoids are. Lactalbumen is in a state of complete solution, and is similar to the serum albumen of the blood. (Cameron and Aikman, 1894.)

Sugar is present in the form of lactic sugar, and the salts are represented by potassium, sodium, lime, magnesia, and iron in combination with phosphoric, chloric, and sulphuric acids. According to Fleischmann the composition of the salts in cow's milk is as follows:

K ₂ O	NO ₂ O	CaO	MgO	Fe ₂ O ₃	P ₂ O ₅	SO ₃	Cl
24.5%	11.0%	22.5%	2.6%	0.3%	26.0%	1.0%	15.6% (—3.5% for Cl and O)

Milk also contains carbonic acid and nitrogen in a gaseous form, and certain aromatics; it has a sweetish taste, and the odor of cow's milk, if proper cleanliness has been observed in washing the udder before milking, has none of the flavor suggestive of its source, but is similar to that of sweet nut-oil.

The quantitative composition of milk varies with the species supplying it. The following table is based upon averages of a large number of analyses, quoted by Uffelmann,² according to which—

100 Parts of—	Albuminoids.	Fat.	Sugar.	Salts.
Cow's milk contains.....	4.00	3.40	3.80	0.60
Goat's milk contains.....	3.50	3.90	4.40	0.80
Mare's milk contains.....	2.08	1.18	5.30	0.40
Ass's milk contains.....	2.22	1.64	6.00	0.30
Sheep milk contains.....	6.31	6.83	4.73	0.20
Human milk contains.....	2.20	3.45	5.00	0.80

It will be seen at a glance that woman's milk is much sweeter than cow's milk, and also contains less albuminoids and salts; the milk from the sheep contains the most, and mare's and ass's milk the least, amount of nutritive elements, while cow's and goat's milk occupy a

medium place. However, it should be remembered that milk from any source varies considerably in composition, and is greatly influenced by the breed and condition of the animal, the character of food, the period of lactation, age, etc. According to Becquerel and Vernois,³ cows at the age of four are in their prime, and supply the most nutritious milk. As this paper is dealing exclusively with cow's milk, hereafter the term milk, unless otherwise stated, has reference to the secretion from the cow, which in composition has been known to fluctuate as follows:

Volume of protein, from.....	2.04—6.18%
Volume of fat, from.....	1.82—7.09%
Volume of sugar, from.....	3.20—5.67%
Volume of salt, from.....	0.50—0.87%

Results of Breed-Tests Conducted by American Agricultural Experiment Stations.

Quoted by F. W. Woll in his Dairy Calendar for 1895.

Breed.	No. of Cows Included.....	No. of Lactation Periods.	Average Yields per Lactation Period.		Average Per Cent Fat.
			Milk.	Fat.	
			lbs.	lbs.	
New York (Geneva)—					
Jersey	4	10	5,788.5	332.4	5.74
Guernsey	4	8	6,450.8	347.7	5.39
Holstein	4	6	9,946.3	312.8	3.15
Ayrshire	4	11	6,816.8	242.2	3.55
Shorthorn	2	2	5,642.9	242.1	4.29
Devon	4	8	4,118.6	180.9	4.39
American Holderness	2	6	4,894.0	176.7	3.61
Maine—					
Jersey	2	4	5,460.0	297.0	5.50
Holstein	2	3	8,369.0	286.0	3.47
Ayrshire	2	4	6,612.0	233.0	3.67
New Jersey—					
Jersey	3	3	7,695.0	376.3	4.89
Holstein	3	3	8,455.0	300.2	3.55
Ayrshire	4	4	7,461.0	275.3	3.69
Shorthorn	3	3	10,457.0	396.3	3.79
Guernsey	4	4	7,446.0	379.0	5.09

Averages for All Breeds and Lactation Periods.

Jersey	9	17	6,048.0	331.8	5.49
Guernsey	8	12	6,783.0	358.2	5.28
Holstein	9	12	9,179.0	302.7	3.30
Ayrshire	10	19	6,909.0	247.3	3.58
Shorthorn	5	5	8,531.0	334.6	3.92
Devon	4	8	4,119.0	180.9	4.39
American Holderness	2	6	4,894.0	176.7	3.61

The animals in the foregoing breed-tests rank on the average as follows:

1. As to yield of fat: Guernsey, Shorthorn, Jersey, Holstein, Ayrshire, Devon, American Holderness.
2. As to yield of milk: Holstein, Shorthorn, Ayrshire, Guernsey, Jersey, American Holderness, Devon.
3. As to richness of milk: Jersey, Guernsey, Devon, Shorthorn, American Holderness, Ayrshire, Holstein.

Average Percentage Composition of Milk from Different Breeds. (König.)

Name of Breed.	No. of Anal-yses.	Water.	Fat.	Casein and Albu-men.	Milk Sugar.	Total Ash.	Total Solids.	Solids not Fat.
Steyer (Austrian).....	12	86.90	4.17	3.24	4.96	.73	13.10	8.93
Simmenthal (Swiss).....	6	87.26	3.79	2.64	5.81	.70	12.74	8.96
Tillerthal (Tyrolean).....	22	87.43	3.70	3.07	5.10	.70	12.57	8.87
Voralberg (Austrian).....	19	87.38	3.54	2.91	5.40	.77	12.62	9.08
Algau (Bavarian).....	4	87.88	3.20	3.22	5.13	.57	12.12	8.92
Bohemian.....	2	86.00	5.06	3.67	4.63	.64	14.00	8.94
Holstein.....	24	88.04	3.25	3.99	4.16	.56	11.98	8.71
Oldenburg (German).....	18	87.95	3.38	3.10	4.81	.76	12.05	8.67
Angler (Danish).....	10	88.15	3.12				11.85	8.73
Shorthorn.....	67	87.20	3.47	3.21	5.43	.69	12.80	9.33
Devon.....	20	86.57	4.44			.64	13.43	8.99
Ayrshire.....	43	86.93	3.58	3.42	5.43	.64	13.07	9.49
Jersey.....	31	85.90	4.32	3.34	5.70	.74	14.10	9.78
Guernsey.....	28	85.39	5.11	3.98	4.38	1.14(?)	14.61	9.50
French.....	12	87.20	3.90	3.07	5.06	.77	12.80	8.90
Scandinavian.....	4	88.00	3.51	2.76	4.97	.76	12.00	8.49

Average Yield and Composition of Milk of Different Breeds. (Hecho.)

Quoted in Woll's Dairy Calendar for 1895.

Breed.	Live Weight, lbs.	Annual Yield.		Average Per Cent.			Per 1,000 lbs. Live Weight.	
		Milk, lbs.	Fat, lbs.	Solids.	Fat.	Solids not Fat.	Milk, lbs.	Fat, lbs.
Shorthorn.....	1,300	6,800	280	12.9	3.8	9.1	5,200	200
Brown Swiss.....	1,300	7,300	275	13.0	3.8	9.2	5,600	210
Holstein.....	1,100	7,700	230	11.8	3.0	8.2	7,000	210
Guernsey.....	1,050	6,600	330	14.7	5.0	9.7	6,300	310
Ayrshire.....	1,000	6,600	245	12.5	3.7	8.8	6,600	245
Jersey.....	900	6,600	300	14.7	5.0	9.7	6,700	330
Angler.....	900	6,600	240	12.0	3.4	8.6	7,900	270
Kerry.....	550	5,000	190	12.5	3.8	8.7	9,000	350

Results of English Milking Trials.

(Averages of breed-tests conducted at the annual dairy shows of the British Dairy Farmers' Association, 1879-93 inclusive.)

Total Number of Animals.....	Breed.	Average Yield of Milk Per Day. Lbs.	Total Solids. Yield per Day.		Fat. Yield per Day.		Solids not Fat. Per Cent.	Live Weight. Lbs.	
			Lbs.	Per Cent.	Lbs.	Per Cent.			
178	Shorthorns.....	44.03	5.659	12.85	1.664	3.78	9.07	1,403	*28
202	Jerseys.....	27.53	4.033	14.62	1.372	4.96	9.66	832	44
77	Guernseys.....	29.36	4.186	14.26	1.418	4.83	9.43	1,038	13
10	Holstein (Dutch).....	45.19	5.534	12.25	1.540	3.41	8.84	1,383	3
18	Ayrshires.....	37.82	5.086	13.45	1.595	4.22	9.23	1,060	7
2	Devons.....	30.12	4.319	14.34	1.476	4.90	9.44		
8	Red Polls.....	35.11	4.551	12.96	1.377	3.92	9.04	1,201	5
1	Welsh.....	46.00	5.860	12.74	1.914	4.16	8.58		
1	Aberdeen Angus.....	60.30	8.285	13.74	3.009	4.99	8.75		
12	Kerries and Dexter Kerriers.....	26.59	3.555	13.37	1.110	4.18	9.19	749	9
33	Crosses.....	42.94	3.654	12.78	1.569	3.65	9.13	1,339	7

* Average for 28 animals, etc.

The milk first secreted after parturition, known as colostrum or beastings, contains less water and more albumen than casein, also more sugar and salts, than the milk given at a later period; it is viscid, turbid, yellowish, with a sickly odor and purgative properties, and, according to König,⁴ has the following composition: Albumen, 6.77%; fat, 3.57%; sugar, 4.68%; salts, 0.82%; water, 84.16%.

In regard to the influence of food upon the composition of milk, it has been shown by Wolff that a large amount of albuminoid food increases the quantity of fat in the milk, but according to Kühne and Fleischer,⁴ diminishes the percentage of lactic sugar. Bran and malt mash and oil cakes appear to increase the amount of fat, but not of albumen and sugar; Girard ascertained that dry food results in a larger amount of albumen, fat, sugar, and salts.

The effects of swill food and distillery and brewery refuse on the milk have been studied for many years. According to Ohlsen,⁵ the milk of swill-fed animals varies greatly in composition, depending largely upon the amount and character of the additional food; such a milk may, at times, be perfectly normal, and again quite deficient in nutritive elements; in general, it is more watery, deficient in fats and salts, especially the lime salts.

The milk varies in composition at different periods of the day and during the different stages of the milking; morning's milk is generally more watery than evening's milk, and the milk which comes from the cow toward the end of milking contains more cream than that which is first given, which is said to be due to the rising of the fat in the gland. According to Uffelmann⁶—

	Water.	Albumen.	Fat.	Sugar.	Salts.
Morning's milk contains.....	87.45	3.30	3.81	4.70	0.74
Evening's milk contains.....	86.92	3.35	4.28	4.71	0.73
First stage of milking contains.....	91.50	2.14	1.49	4.10	0.71
Second stage of milking contains.....	90.11	2.36	2.37	4.50	0.76
Third stage of milking contains.....	88.96	2.06	4.10	4.06	0.76

Violent exercise and overheating or working the animals, as in some parts of Europe and in the Southern States, are injurious to the quality of the milk.

The reaction of cow's milk is quite variable. If fresh, and from a healthy and properly cared for animal, it should be "amphoteric" or alkaline. This is due to the fact that milk contains NaH_2PO_4 , which has an acid reaction, and also Na_2HPO_4 with an alkaline reaction. When milk is boiled, it becomes more alkaline. Milk is often acid, especially from swill-fed animals; but this, according to Ohlsen's investigation, is by no means always the case.

The specific gravity varies with the quality, and fluctuates between 1029 and 1034, with an average of 1030.8.

Cream. If milk is allowed to stand quietly in a vessel or broad shallow pan, the oil globules, by reason of their light specific gravity, rise to the surface, and, on account of their albuminoid constituents and consequent cohesive properties, they carry along certain amounts of sugar and salts, forming a film of varying thickness.

Sweet cream, according to König,⁴ contains: Water, 66.51%; albumen,

3.61%; fat, 26.75%; sugar, 3.52%; and salts, 0.61%. Vieth,* in examining cream obtained from milk by a centrifuge, found it to contain: Water, 32.59%; albumen, 4.61%; sugar, 4.61%; fat, 50.36%; salts, 0.42%.

The normal average of cream is about 10% of the volume of milk, and if it falls much below this, it indicates a poor quality or that the milk has been watered; the cream may exceed 20%, depending largely upon the breed and other conditions already mentioned.

Changes in the Milk. Milk, after standing several hours, assumes an acid reaction, which is the result of the conversion of milk-sugar into lactic acid, brought about by the agency of several species of micro-organisms, chief of which is the *Bacillus acidi lactici*,[†] which finds in milk a very suitable medium for its multiplication, and develops best at a temperature of between 95° and 108° Fahr., but ceases to grow altogether at a temperature of 50° Fahr. When sufficient lactic acid is present to fix the alkalies, casein is set free and the milk coagulates. In the meantime, a portion of the albuminoid bodies, albumen as well as casein, is converted into peptones through the agency of other micro-organisms. The bacilli of butyric acid for example, not only possess the power of forming this acid, but also, like rennet, of coagulating casein and transforming it into peptone; and other saprophytic microbes are believed to possess similar properties. (See also Dairy Bacteriology.)

II. PREPARATIONS OF MILK AND DAIRY PRODUCTS.

1. *Skimmed Milk* is the residue after the cream has been removed, and has the following average composition: Water, 90.63%; proteid, 3.06%; fat, 0.79%; sugar, 4.77%; and is especially indicated in delicate stomachs, which cannot take fat.

2. *Boiled Milk* has lost its natural gases and aromatics, also some of its watery constituents; when boiled in an open pan the loss of weight, even after the first ebullition, amounts to 5%, as compared with a loss of 0.5% to 1% when boiled in a long-necked bottle. Owing to the loss of CO₂ in boiling, milk loses its amphoteric reaction and becomes alkaline with a flat taste. The coat of cream upon the surface of boiled milk contains about 21% of albumen, 10% to 16% of fat, with small amounts of sugar and salts, and from 60% to 62% of water; this scum can be entirely prevented by boiling the milk in a narrow and long-necked flask. Whilst Albu, Soltman, and J. Munk assert that the digestibility of boiled milk is greater than that of raw milk, Uffelmann finds that there is no difference in that respect; but for reasons which will be fully explained hereafter, the consumption of raw milk is fraught with danger, and sterilization seems absolutely necessary to prevent infection, especially of the germs of tuberculosis, typhoid fever, scarlet fever, diphtheria, foot and mouth disease, anthrax, etc. Boiling will also arrest the growth of fungi and destroy the *Bacillus acidi lactici*, and many other saprophytic germs which cause the process of souring; and this simple expedient enables us, therefore, not only to keep the milk much longer fresh and sweet, but also to kill such disease germs as may be present.

3. *Buttermilk* contains all of the constituents of milk; the amount of fat is, of course, reduced, as well as of milk-sugar, which has been largely converted into lactic acid. The composition of buttermilk is as follows:

Protoid.	Fat.	Sugar.	Salts.	Lactic Acid.	Author.
3.60	0.50	4.06—	0.85	0.80	Vieth.
3.48	1.25	3.30	0.65	0.32	----- J. König.

The presence of lactic acid imparts an agreeable taste, and as the milk still contains considerable nutritive elements, with the casein in a very flocculent form, and has the additional advantage of being cheap, it is considered a very desirable article of food. It should be consumed quite fresh, as it soon decomposes; the presence of lactic acid and other ferments are, moreover, liable to induce colic and diarrhoea in children and in persons with feeble digestion. It, however, appears to agree with persons in whom there is incomplete digestion of fats and peptones; also, according to Eulenberg, in cases of chronic gastric catarrh with atrophy of the gastric glands; the "buttermilk cure" has also been employed in the treatment of Bright's disease.

4. *Butter* is made by churning the cream of milk. In consequence of some violent agitation, the fat globules coalesce and then adhere together in small masses, containing also some slight quantities of casein, serum, sugar, and salts, as follows:

Fat.	Albuminoids.	Sugar.	Salts.	Water.	Author.
85.37	0.97	-----	0.74	12.92	----- Vieth.
83.27	0.71	0.58	0.95	14.49	----- König.

Twenty-five to thirty liters of milk usually yield about 1,000 grms. of butter. The presence of too much water or of ingredients other than fat shows that it has not been sufficiently worked, and this, together with exposure to sunlight, favors germ development and the production of butyric acid, and we get our "rancid butter," which is likely to cause violent gastric derangement. Fresh butter, without salt, is not only quite tasteless, but also keeps poorly, hence the addition of 25 grms. of common salt per 1,000 grms. of butter, together with facilities for cold or cool storage, is quite necessary to prevent rancidity; this may also be accomplished by keeping it under fresh water renewed every day, by the addition of weak tartaric acid, or by melting it down with boiling water—the "smalt process" (Thompson).

The *digestibility* of butter, if taken in moderate quantities, is remarkably good, as nearly 98% is utilized. The value of bread and butter as a foodstuff has always been recognized, and, according to Brunton, the ingestion in this form, or on toast thinly spread, prevents it from floating about and coating the walls of the stomach and retarding gastric secretion. Butter is frequently adulterated by the addition of suet, oleomargarine, coloring matter, buttermilk, excess of water and salt, or potato-starch, flour, etc.

5. *Cheese.* In the manufacture of cheese, casein and the milk fat are precipitated by the addition of rennet to sweet milk, preferably at a temperature of about 120° Fahr., which insures firmer coagulation. The curds are then pressed in a mold, which removes the whey and reduces the mass to a proper consistency, to which a little salt or other spices have previously been added. The mass is now dried on the surface by frequent turning in the air, and allowed to ripen, during which, according to the amount of atmospheric humidity present, it loses from 10% to 20% of water. During the process of decomposition the milk-sugar is converted into lactic acid, a portion of the fat into free fatty acids, and a part of the casein is transformed into peptone and organic bases like leucin, tyrosin, butylamin, and amylamin—it may, however, putrefy and evolve ammonia and tyrotoxin. The organic bases mentioned are the result of different ferments, and enter into combinations with the lactic acid, in consequence of which the green cheese assumes a yellowish color, a fatty character, and a neutral or alkaline reaction, and acquires its aroma and piquancy. (See Dairy Bacteriology.)

Pot cheese is often eaten fresh, after the whey is pressed out. It contains: Water, 60.27%; casein, 24.84%; fat, 7.33%; ash, 4.02%; sugar and lactic acid, 3.54%.

The *nutritive value* of cheese, whilst very great, depends, of course, largely upon the amount of cream used in the milk, and upon the care taken in its manufacture. Most of the cheeses are made from normal milk; in some of the rich English and Swiss cheeses, cream has been added, whilst still others, like the Dutch, Parmesian, and some of the American cheeses, are made from skimmed milk. The latter varieties usually keep better, and are hard enough to be grated. The following table, taken from Uffelmann's *Hygiene*,³ gives the composition of some well-known varieties:

	Albumen.	Fat.	Sugar.	Salts.
Chester cheese	27.68	27.46	5.89	5.01
Edam cheese	24.07	30.28	4.48	4.91
Emmenthaler cheese	32.42	29.67	....	4.78
Dutch cheese	29.48	26.71	2.27	4.62
Holstein cheese	23.24	25.00	3.64	4.17
Roquefort cheese	27.69	33.44	3.15	5.55
Neufchatel cheese	17.44	40.80	5.21	2.05
Parmesian cheese	41.19	19.52	1.18	6.31

The *digestibility of cheese* is very good; 96% of its albumen, 97% of the fat, and 100% of the carbohydrates are utilized, provided it is ingested in moderate quantities, preferably in very thin slices or grated, and should never be taken in the form of "toasted cheese." The richer cheeses, unless eaten quite sparingly, are very apt to produce dyspepsia.

Cheese has been known to be adulterated by the addition of flour, starch, foreign fats, and coloring matter. It may be rendered totally unfit for use by the presence of molds and fungi, the cheese mite, maggots, and especially by the presence of "tyrotoxin," the product of saprophytic microbes, which causes symptoms allied to those of "belladonna poisoning."

Cheese may also absorb lead from its tinfoil wrappers, and has proved poisonous in cases where henbane seed had been accidentally substituted for caraway seed.

7. *Whey* is the serum which remains after the curds have been pressed out from the milk to make cheese. This fluid contains: Water, 93.3%; sugar, 4.65%; fat, 0.25%; proteid, 0.82%; lactic acid, 0.33%; salts, 0.65%. It is believed to possess sudorific and diuretic properties, and has been employed in the treatment of fevers and in gastric catarrh and Bright's disease. The "whey cure" is frequently combined with the "grape cure," or some easily digested food. Not over 500 grms. per day are tolerated, and larger quantities are apt to cause colic and diarrhoea.

8. *Milk Conserves*. Milk may be rendered more stable either by boiling, as already indicated, or by exposure to cold in the various milk-coolers. Swarz suggests that the milk should be strained, immediately after milking, into oval pans, placed upon ice, and brought to a temperature of 36°–45° Fahr.; but as an additional safeguard, the writer believes that it should be sterilized before it leaves the milk farm and after reaching the house. Antacids, like sodium carbonate or borate, or the addition of salicylic acid, cannot be recommended for the purpose of keeping the milk sweet.

9. *Condensed Milk*. There are a great number of brands in the market, all made by the slow evaporation of the water of the milk by moderate heat, with or without the addition of sugar.

In the plain variety, the milk is condensed to about one third or one fifth of its original volume, and the average composition of ten American brands was found to be as follows:

Water.	Fat.	Albu- minoids.	Sugar.	Ash.	Analyst.
45.59	15.67	17.81	15.40	2.53	----- Hehner, quoted by Woll.
57.98	16.02	8.50	16.32	2.20	----- Voelker.
51.72	14.33	11.69	19.51	2.75	----- Voelker.
51.76	15.34	12.66	17.07	2.49	

When either cane- or milk-sugar has been added, the condensed milk may contain from 36% to 75% of sugar, 8.82% of albuminoids, 8.67% of fat, and 1.83% of salts. The advantage of condensed milk consists in the fact that it can be readily kept, even after the can is opened, provided it is again covered up, and is therefore useful for long sea-voyages, field service, and in the tropics. During the hot months it has been largely used in the feeding of infants, especially by the poorer classes, with questionable results.

10. *Milk-Wines*, like "koumiss" and "kefyr," are made from mare's or cow's milk, respectively, and are the products of a peculiar fermentation, combining alcoholic with lactic acid fermentation. The best koumiss is made on the plains of southeastern Russia, from well-selected mare's milk, in the early summer months. The milk is put into smoked-out leather bottles, and koumiss or kefyr ferment is added. These kefyr grains contain, apart from yeast-fungi, also a specific lactic acid germ, and the *Bacillus kaukasicus*, collected from receptacles previously used for the fermentation of the milk. The skins are kept warm and frequently shaken, and at the end of three or four days the

fermentation is completed. Koumiss is also made from cow's milk and the addition of a portion of the previous brewing, and also a little yeast. In either event, the beverages contain, in addition to the constituents of the milk, also alcohol and carbonic dioxide in the following proportions:

	Native Koumiss.	Cow's Milk Koumiss.	Kefyr.
Albuminoids	2.20	2.35	3.12
Fat	2.12	2.07	1.95
Sugar	1.53	1.81	1.62
Lactic acid	0.90	0.40	0.83
Alcohol	1.72	1.90	2.10
Carbonic acid	0.85	0.80	0.92

Flügge, quoted by Sternberg, gives the following directions for the preparation of this drink: "Two methods may be employed. In the first, the dry, brown kefir grains of commerce are allowed to lie in water for five to six hours until they swell; they are then carefully washed and placed in fresh milk, which should be changed once or twice a day until the grains become pure white in color, and when placed in fresh milk quickly mount to the surface—in twenty to thirty minutes. One liter of milk is then poured into a flask, and a full tablespoonful of the prepared grains added to it. It is allowed to stand open for five to eight hours; the flask is then closed and kept at 65° Fahr. It should be shaken every two hours. At the end of twenty-four hours the milk is poured through a fine sieve into another flask, which must not be more than four-fifths full. This is corked and allowed to stand, being shaken from time to time. At the end of twenty-four hours a drink is obtained which contains but little CO₂, or alcohol. Usually it is not drunk until the second day, when, upon standing, two layers are formed, the lower milky, translucent, and the upper containing fine flakes of casein. When shaken it has a cream-like consistence. On the third day it again becomes thin and very acid.

"The second method is used when one has a good kefir of two or three days to start with. Three or four parts of fresh cow's milk are added to one part of this, and poured into flasks, which are allowed to stand for forty-eight hours, with occasional shaking. When the drink is ready for use a portion ($\frac{1}{4}$ to $\frac{1}{2}$) is left in the flask as ferment for a fresh quantity of milk. The temperature should be maintained at about 65° Fahr., but at the commencement a higher temperature is desirable. The grains should be carefully cleaned from time to time, and broken up to the size of peas. The cleaned grains may be dried upon blotting-paper in the sun or in the vicinity of a stove; when dried in the air they retain their power to germinate for a long time."

The specific gravity of these milk-wines fluctuates between 1018 and 1029, and the composition changes from day to day, with a tendency to become more acid when exposed to the air. The utmost care must be exercised in its preparation, and it keeps poorly after the bottle is opened.

Koumiss is a refreshing beverage, diaphoretic and diuretic, and is said to increase the cardiac and vascular tone, and to improve the general nutrition. The "koumiss cure" has been employed with benefit in the treatment of consumption, chronic catarrhal affections, and other wasting diseases, and is contra-indicated in plethora, renal and vascular

diseases. From fifteen to twenty glasses, with light nourishing food, are taken daily in small quantities but at frequent intervals; it is generally taken warm, in gradually increased doses. Some marvelous cures have been reported from the native article consumed in its native place, but here, as in many other cases, the influence of climate, habits, and better hygienic environments, doubtless also play an important rôle.

III. DIETETIC AND THERAPEUTIC USES OF MILK.

Digestibility of Milk. Milk is not quite as readily digested as meat. Gerber found that 92% of the milk ingested by the mouth was absorbed, whilst, according to Rubner,¹⁰ from 89.8% to 92.3% is utilized. Uffelmann's experiments in his own person showed that from 90% to 91.7% of the milk taken is digested, and the different constituents in the following proportion:

Albumen to the extent of	98.7—99.2%
Fat to the extent of	93.4—95.6%
Sugar to the extent of	100.0%
Salts to the extent of	44.2—56.6%

Cow's milk contains all the necessary elements for maintaining life, viz., C, O, N, and H. The human body requires for daily consumption 18.3 grms. N and 328.9 grms C. To obtain the requisite N from milk 2,905 grms. must be ingested, and to obtain the requisite C, 4,652 grms. must be drunk. This excess of nitrogenous matter in proportion to the carbohydrates is likely to interfere with digestion, and while milk in proper proportions answers very well as an exclusive diet for infants, and especially during the first year of life, it is by no means suitable as such for healthy adults—it appears to disagree with many persons, causing constipation and biliary and dyspeptic disturbances—and this fact should not be lost sight of in the treatment of disease, even though it is true that, in the majority of cases of weak stomach and fevers, an almost exclusive milk diet proves highly beneficial. The dietetic value of milk is especially marked in the so-called wasting diseases, such as phthisis, chronic febrile affections, hysteria, etc., simply because the excessive expenditure of nitrogen in the system in such cases is promptly replaced in a most assimilable form by the relative excess in the milk. In many instances of persons suffering from an excess of acidity in the stomach an exclusive milk diet will disagree, on account of the rapid coagulation of the casein, decomposition of the alkaline salts, and liberation of phosphoric acid, all tending to produce a gastro-enteric catarrh, during which undigested coagula are often passed in the stools. In such cases milk may be well borne if given in smaller quantities frequently repeated, or when taken in the form of cocoa, chocolate, or ice cream. The formation of large coagula in the stomach may be prevented by the addition of plain boiled water, soda water, lime water, rice or barley water.

Jacobi¹¹ and Rudisch recommend the following combination: Mix one pint of water, 3ss acid hydroch. dil. with one quart of milk; boil for fifteen minutes; stir well. This preparation is easily retained by weak stomachs in cases of anæmia, gastric ulcer, and other chronic digestive derangements; the addition of pepsin and a little table salt often improves its digestibility.

Milk is an invaluable article of diet in cases of cancer of the stomach. Whilst Oppolzer recommends sour milk in such cases, as being less liable to form hard curds, Thompson very properly prefers to peptonize the milk, by adding a sufficient amount of pepsin and allowing it to stand in a bottle placed in hot water. During the resulting fermentation, the casein and albuminous bodies are more or less converted into peptone, and further transformation can be arrested by either boiling the milk or putting it upon ice until ready for use.

The so-called "milk cure" has been practiced by numerous physicians in obstinate cases of hysteria, hepatic disorders, dropsy, various anomalies of nutrition, phthisis, etc., and Dr. S. Weir Mitchell" has been especially successful in the treatment of neurasthenia and hysteria, the results of which are so pleasantly presented in his essays on "Fat and Blood," in which he acknowledges indebtedness to Dr. Karell, of St. Petersburg, for our knowledge of the value of milk as an exclusive diet, and which he regards as invaluable in the treatment of those cases, especially when combined with rest, massage, and electricity. Dr. Mitchell employs well-skimmed milk, as fresh as possible, and, for the treatment of dyspepsia or albuminuria, the milk must be creamless, given in doses at first not to exceed four ounces, at least every two hours, increasing the quantity and lengthening the intervals, but not beyond three hours, during the day time only, the last dose to be taken about bedtime. If the patient be wakeful, a glass should be left within his reach, and in any event the milk should be resumed early in the morning. If the taste of the milk is disagreeable to patients, a little tea, coffee, caramel, or salt is added to flavor it; if its use give rise to acidity, the corrective measures already referred to are resorted to.

Dr. Mitchell points out that at first we can scarcely give enough of skimmed milk to sustain the functions, and for several days the patient is apt to lose weight; but this soon ceases, and in the end there is usually a gain. While in most of the "rest cases" an exclusive milk diet may be dispensed with after a week, still there are cases where, when taken alone for weeks or months, there is frequently a large increase in bodily weight.

During the first weeks of an exclusive milk diet, there is usually marked sleepiness, a white furred tongue, constipation, and yellowish stools of a peculiar odor—the latter conditions should of course be relieved—the water of the urine is increased, which is especially desirable in dropsical and lithæmic subjects; uric acid usually disappears entirely under the influence of skimmed milk. As the case progresses, Dr. Mitchell finds it useful to add thin slices of white bread, arrow-root, rice, or some one of the various "infant foods," and after a few weeks, raw meat or one or two cutlets are added.

In women who are excessively fat and may or may not be hysterical, but are feeble, anæmic, and otherwise wretched, he places them on skimmed milk alone, or gives skimmed milk with the usual food, and in a week or two puts aside all other diet save milk and all other fluids. If the milk sustains the bodily weight the quantity is diminished until the patient loses one half pound each day, more or less. In the meantime, rest in bed, massage, and later Swedish movements are employed, and the vital powers strictly observed. If there are signs of feebleness, the diet is increased by the addition of beef, chicken, or oyster broths, and when the weight of the body has been sufficiently lowered, beef,

mutton, oysters, etc., are allowed, and finally a full diet, but with only a moderate amount of hydrocarbons, the milk remaining a large part of the food. In anæmic subjects, he adds to the treatment lactate of iron in full doses.

In a very large class of feeble, thin-blooded, neurasthenic or hysterical women, if there be only congestive or morbid states of the womb or ovaries, which he believes are best treated by a general gain in health, he begins with three or four ounces of milk every two hours, and increases the quantity gradually until, at the end of a few days, at intervals of three hours, two quarts are taken. A cup of coffee, or mild doses of watery extract of aloes, with two grains of dried ox-gall, usually overcome the constipation, and this simple milk diet enables him to lay aside the use of chloral, bromides, and morphia, to which so many of these cases have become victims. In the meantime, the mechanical treatment is pursued, and after four to six days the patient is permitted to take also a light breakfast, followed in a day or two by a mutton-chop for dinner, and again in a day or two he adds bread and butter thrice a day, and within ten days is usually able to allow three full meals daily, with three or four pints of milk given at or after meals in place of water. After ten days he orders also two to four ounces of fluid malt extract before each meal. As to the meals, the patient's tastes, if not unreasonable, are consulted; he likes to give butter largely, and finds no trouble from it, and considers a cup of cocoa or of coffee with milk on waking in the morning a good preparation for the fatigue of the toilet. (In view of the importance of the subject, we trust Professor Mitchell will pardon our extended reference to his work, which contains such valuable information that no physician should be without it.)

Dr. Donkin extended Karell's system of milk diet to the treatment of diabetes, in which he orders four ounces of skimmed milk every two hours, gradually increased to half a pint every two or three hours. With the general precautions already given, the patients should be able to accustom themselves to this diet, which is of special value at the very onset of the disease, but is unfortunately too often only resorted to as a last resort. Pepper has substituted koumiss for the skimmed milk.

While discussing the diatetic and therapeutic uses of milk, it is proper to mention that it has been successfully employed in man, as an *intra-venous injection* in postpartum and traumatic hemorrhage, and in cholera collapse, but offers no advantages and is perhaps more dangerous than the transfusion of a saline solution.

Milk has been given hypodermically in spinal caries with enfeebled digestion in doses of 4 grms; and, according to Whittacker, one patient was kept alive by this method for sixty-eight days. The milk is all absorbed in twenty-four hours, and only in exceptional cases have abscesses formed at the seat of injection. It has also been injected into the peritoneal cavity, and is, of course, frequently used, either alone or with beef-juice peptonoids and stimulants in the form of nutritive enemata. The injection of *pure milk* into the rectum is of doubtful efficacy, as the rectal mucosa are unable to digest it, and may even cause harm by putrefactive changes; it should, therefore, be previously peptonized. In any event, the rectum should be first washed out, and one or more ounces should be injected through a catheter, introduced as high as the sigmoid flexure, while the patient is upon his hands and

knees. This will insure a more ready absorption by the superior hemorrhoidal or sigmoid vessels, and as these vessels empty quite directly into the portal vein, also a more speedy assimilation.

In cases of gastric ulcer, cancer of the stomach, obstruction of the digestive tube, or uncontrollable vomiting, patients have been kept alive for weeks and months by such enemata, to which a little laudanum may be added, whilst the pressure of a folded towel against the perineum also aids in their retention.

We are, of course, all familiar with the nutritive value of egg-nog and milk-punches, as well as the various preparations of milk in broths, gruels, custards, etc., without which our reconstructive efforts in cases of acute and chronic exhaustion would be seriously baffled. A brief description of the principal preparations is therefore given:

1. *Egg-nog* is made by adding the beaten yolk of egg and sufficient wine, whisky, or brandy to a glassful of milk, stirring well by means of an egg-beater, and adding sugar and the white of the egg separately beaten, and flavoring with nutmeg, cinnamon, lemon, or vanilla.

2. *Milk-punch* is made by the addition of brandy, whisky, or rum to milk, in the proportion of one to four or six parts of milk, or as may be directed by the attending physician, and flavoring with sugar, nutmeg, etc.

The addition of half an ounce of lime-water to either of these preparations improves their digestibility without impairing their taste.

3. *Arrow-Root Milk*.¹³ Put into a pan 4 ozs. of arrow-root, 3 ozs. of sugar, the peel of half a lemon, $\frac{1}{4}$ teaspoonful of salt, $2\frac{1}{2}$ pints of milk; set it on the fire, stir round gently, boil for ten minutes, and serve warm or cooled. If no lemons are at hand, some other flavoring extracts will do.

4. *Thick Arrow-Root Panada*.¹³ Put in a pan 5 ozs. of arrow-root, $2\frac{1}{4}$ ozs. of white sugar, the peel of half a lemon, $\frac{1}{4}$ teaspoonful of salt, 4 pints of milk; mix all well, set on the fire, boil for ten minutes under constant stirring, and serve.

5. *Cornstarch Blanc-Mange*.¹³ Beat 6 tablespoonfuls of cornstarch thoroughly with 3 eggs; add to it 1 quart of milk nearly boiling and previously salted a little; allow it to boil a few minutes, stirring briskly. Flavor with lemon or vanilla, and pour into a mold to stiffen. It may be sweetened before cooking or after with a sauce.

6. *Boiled Custard (Cornstarch)*.¹³ Heat 1 quart of milk nearly to boiling; add 2 tablespoonfuls of cornstarch previously mixed with a little milk, 3 eggs well beaten, with 4 tablespoonfuls of powdered sugar, $\frac{1}{2}$ teaspoonful of salt, and a small piece of butter. Flavor with lemon or vanilla. Let it boil up once or twice, stirring briskly, and it is done. To be eaten cold.

7. *Farina Pudding*.¹³ Boil 3 pints of milk, into which, while boiling, sprinkle slowly $\frac{1}{4}$ lb. of farina. Continue the boiling three quarters of an hour. Turn it into a jelly-mold, and place it on ice or in cold water to stiffen. It may be eaten with pulverized sugar. The boiling should be conducted in a double boiler or in a saucepan placed in a pan of water to avoid burning.

8. *Sweet Rice*.¹³ Add to $\frac{1}{2}$ lb. of rice, plain boiled, 1 oz. of butter, 2 tablespoonfuls of sugar, a little cinnamon, $\frac{1}{4}$ pint of milk; stir it with a fork, and serve. A little currant jelly or jam may be added to the rice.

9. *Rice Pudding*.¹³ Put $\frac{1}{2}$ lb. of washed rice in a stewpan, 3 pints of milk, 1 pint of water, 3 ozs. of sugar, 1 lemon peel, 1 oz. of fresh butter; boil gently one half hour, or until the rice is tender; add 4 eggs well beaten; mix well; bake quickly for one half hour, and serve.

10. *Bread Pudding*.¹³ Boil 1 pint of milk with a piece of cinnamon and lemon-peel; pour it on 2 ozs. of bread crumbs, then add 2 eggs and a little sugar; steam it in a buttered mold or pan for one hour.

11. *Custard Pudding*.¹³ Boil 1 pint of milk with a small piece of lemon-peel and half a bay-leaf, for three minutes; then pour these on to 3 eggs; mix it with 1 oz. of sugar well together, and pour it into a buttered mold or pan; set this in a stewpan with some water; steam it for twenty-five minutes; turn it out on a plate, and serve.

12. *Sago Pudding*.¹³ Put into a pan 4 ozs. of sago, 2 ozs. of sugar, $\frac{1}{4}$ lemon-peel, or a little cinnamon, a small nut of fresh butter, and $\frac{1}{2}$ pint of milk; boil for a few minutes, or until rather thick, stirring all the while. Beat up 2 eggs, and mix quickly with the same. It is then ready for either baking or steaming.

13. *Tapioca Pudding*.¹³ Put into a pan 2 ozs. of tapioca, $1\frac{1}{2}$ pints of milk, 1 oz. of white sugar, and a little salt; set it on the fire; boil gently for fifteen minutes, or until the tapioca is tender, stirring now and then to prevent sticking and burning; then add 2 eggs well beaten; steam or bake, and serve. It will take about twenty minutes steaming, or one quarter hour baking slightly. Flavor with either lemon, cinnamon, or any other essence.

14. *Milk Jelly*.¹⁴ Cut up one cow-heel into small pieces, place them into an earthen jar or a saucepan, with 1 quart of milk and a 2-inch stick of cinnamon; cover the vessel

tightly with lid and paper, and stew in a slow oven for at least three hours; strain into a basin, and sweeten and flavor according to taste; pour into molds or set it aside till the jelly is set. Serve hot or cold.

15. *Milk Jelly with Iceland Moss.*¹⁴ Soak 1 oz. of Iceland moss previously washed, all night; take it out and squeeze it dry, and boil it with 1 quart of milk for two hours, with frequent stirring; strain into a basin, sweeten and flavor according to taste.

16. *Milk Soup.*¹⁴ Take 4 large potatoes, cut in quarters, also 2 leeks (or onion) tops cut up, and place into 2 quarts of boiling water; add 2 ozs. of butter, $\frac{1}{4}$ oz. of salt, and pepper to taste, and boil to a mush; strain off the soup through the colander, and rub the vegetables through it with a wooden spoon; return the pulp and soup to the saucepan, add 1 pint of milk, and boil; upon boiling sprinkle in, by degrees, 3 tablespoonfuls of crushed tapioca; boil gently for fifteen minutes, stirring it well; remove, and serve.

17. *Peptonized Milk Gruel.* Take $\frac{1}{2}$ pint of thick, well-boiled oatmeal-gruel, and while still boiling pour into a stoneware jug with a lid (previously warmed), add $\frac{1}{2}$ pint of new milk (made luke-warm by setting it in a pan of boiling water), and also add 1 $\frac{1}{2}$ teaspoonfuls of liquor pancreaticus. Stir all well together, and then put the jug under a tea-cosy for one hour, and place into a small enamelled saucepan well heated with boiling water; and after the gruel has been brought quickly to the boiling-point, boil it for two minutes, stirring all the time. Strain through a fine hair-sieve, put it in a covered jug, and set it in a cool place until required. When wanted for use, place a covered breakfast-cupful in a pan of boiling water for ten or fifteen minutes. This gruel should be made every day. In place of oatmeal, arrow-root, infant's food, corn flour, rice flour, or any other farinaceous substance may be used. (Thompson.¹⁵)

In addition to the preparations already mentioned, the invalid may be tempted to consume liberal quantities of milk in cocoa, chocolate, ice creams, milk-toasts, milk biscuits and rolls, oyster-stews, etc.

IV. IMPURE MILK IN RELATION TO INFANTILE MORTALITY AND OTHER INFECTIOUS DISEASES.

According to Oesterlein's statistics, it is safe to assert that the average death-rate during the first year of life is 188 out of 1,000 infants born. In England the average is 141.8; in France, 223.2; in Italy, 273.3. (Farr.) These are mean rates for rural and urban districts. In towns and cities the mortality is always higher, amounting to 33.6%, as compared with a rural mortality of 27.8%. In some of the large cities the infantile mortality is simply frightful, having reached as high as:

480	per 1,000	at Chemnitz.
360	" "	" St. Olave.
320	" "	" Glauchau.
290	" "	" Paris.
277	" "	" New York.
276	" "	" Brooklyn.
268	" "	" Baltimore.
261	" "	" Boston.
256	" "	" Washington.
250	" "	" Liverpool.
230	" "	" Philadelphia.

The still-births are excluded in the American statistics. From these figures it appears that, in many cities, out of every 100 children born alive, over one fourth perish before the completion of the first year, but fortunately for the perpetuation of the human race, the average infant mortality all over the world is only about one sixth of those born.

Of the twelve months during the first year of life, the first month furnishes the highest mortality, followed by the second, third, and fourth months, next by the twelfth month; this jump from the fourth to the

twelfth month is quite suggestive, as it is the usual period of weaning, with its attending danger from digestive diseases incident to artificial feeding; next to the twelfth month comes the fifth, sixth, seventh, eighth, ninth, tenth, and eleventh months. During the second and subsequent years the mortality gradually decreases, and of children between the age of 1 and 5 years there die annually 37 out of 1,000. A loss of 188 during the first year, with 148 during the next four years, makes a total loss of 336 out of every 1,000 children born.

The mortality is greatly influenced by climate and seasons, as shown by a higher rate in the polar and equatorial regions with extremes of heat and cold. Generally speaking, the mortality is higher during the cold months than during the moderate months, on account of the greater prevalence of diseases of the respiratory organs; but the hot months like June, July, and August are the most dangerous, at least in this country and Europe, on account of the disastrous attacks of gastro-enteric diseases. The fatal influence of heat and cold upon infantile mortality is well illustrated by the tables published in Dr. Busey's essay on the "Mortality of Young Children," and while they apply to the City of Baltimore, because the essay was written at the request of the trustees of the Thomas Wilson Sanitarium for Children of that city, they are no less true of other large manufacturing cities.

It would lead me too far to consider the various meteorologic conditions which influence the mortality rates as shown in these tables; but we should at least bear in mind, that sudden changes in temperature are especially liable to offend the peripheral nerves and thus cause an irritation, which is transmitted by reflex action to other parts of the body, where it may induce congestions, especially in the respiratory and digestive tracts. During the heated term the blood, too, owing to an excessive function of the skin, is deprived of some of its constituents; it is taken away too much and too long from the internal organs; the proper distribution of the blood-supply is interfered with; in consequence, the tone of the stomach, heart, brain, and other tissues is lowered, appetite and digestion suffer, the red corpuscles are decreased, and not only infants, but also adults, experience languor and general debility; but apart from this, and more intimately connected with the subject, remains the fact that heat not only tends to diminish the power of resistance of every cell to disease, but also favors the development of germ life in the milk.

This excessive infantile mortality has always been considered the opprobrium of the healing art. Dickson asked in vain: "How shall we prevent the early extinction of half the new-born children of men?" West truthfully asserts: "At least a third of all your patients will be children, and so serious are their diseases that one child in five dies within a year after birth, and one in three before the completion of the fifth year;" and Swayne pathetically exclaims: "May it fall to the lot of some reader ere long to solve this startling problem."

While powerless to solve the mysteries connected with this subject, many of which are doubtless connected with the mortality laws in general, an attempt will be made to answer the practical question, Can they be reduced? I cannot enter into details of infant hygiene, but must at least point out the fact that the mortality can be greatly reduced by improving the original stock, *i. e.*, the physique and habits of the parents, and placing them, as well as their offspring, under more suit-

able environments, especially with reference to fresh air, sunlight, exercise, suitable clothing and habitations, and last, but not least, proper food. The influence of favorable hygienic conditions is demonstrated by Casper's statistics published in 1825, showing that the mortality rate among royal children was only 57 per 1,000, as compared with 345 per 1,000 among the infants of the poor. Clay calculates that of every 100 children born in England, 90 will be alive of those born in aristocratic families, 79 in the mercantile class, and 68 among the laboring classes. The difference in the mortality of legitimate and illegitimate children is very great, and varies, according to Uffelmann, as follows:

	Legitimate Children.	Illegitimate Children.
In France, mortality of	15.0%	30.0%
In Austria, mortality of	22.9	35.1
In Sweden, mortality of	13.0	24.8
In England, mortality of	14.0	35.0

But the most frightful mortality rates are everywhere furnished by the hand- or bottle-fed children, amounting in Berlin 40% to 47%, in Hamburg 29.4%, and in Paris, according to Monat, it has reached as high as 70% to 75%. Professor Kehrer informs us that of 8,329 infants six months of age and under, that died in Munich between 1868-1870, 1,231, or nearly 15%, had been suckled from the breast, and 7,098, or over 85%, had been hand- or bottle-fed.

If we stop to inquire into the immediate cause of the excessive infantile mortality during the first twelve months, we find that about 40% perish from diseases of the digestive system, about 21% die from affections of the respiratory organs; next in frequency are the infectious diseases like diphtheria, scarlet fever, measles, whooping-cough, mumps, scrofulosis, and tubercular affections, rickets, etc. The extreme incident of a mortality of 40% from gastro-enteric disorders and the mortality of 2.5 per 1,000 from primary tubercular diseases of the abdominal lymphatics, cannot fail to force themselves on our attention, and certainly point with more than mere suspicion to the fact that the morbid agent in these cases is introduced into the body with the food.

Notwithstanding these startling arguments against artificial feeding, the facts are that there will always be a large percentage of infants deprived of their natural food, and the question therefore confronts us, What is the best possible substitute for human milk, the requirements of which are:

1. That it must offer the same character and amount of nutritive elements, and in the same proportion, as human milk.

2. The nutritive elements must be present in the same assimilable form, of the same consistency, and should be introduced into the stomach at a temperature not less than 98° Fahr. by means of suction and at proper intervals.

3. This substitute must not contain any morbid or infective agent, whether originally present or introduced during the preparation or keeping of the same.

A moment's reflection upon the physiology of infantile digestion will at once suggest the propriety of rejecting all farinaceous foods before the expiration of the tenth month, except in very limited quantities and

previously converted into maltose by boiling, as in barley water; but as milk is the natural food of all mammalia, few will be disposed to doubt that some modification of cow's milk offers the best possible substitute.

Comparison of Cow's Milk and Human Milk.

Average Composition of—	Albumin- oids.	Fat.	Sugar.	Salts.
Cow's milk.....	3.76	3.75	4.42	0.68
Human milk.....	2.00	4.13	7.00	0.20

Human milk contains, therefore, less albuminoids and salts and more sugars and fats; there is also a decided difference in the quality of the casein of the two secretions. The addition of dilute acid to cow's milk precipitates the casein in hard coagula or lumps, while in human milk it separates into a fine powder, giving the appearance of light flocculent curds, which readily dissolve in an excess of acid. Since the coagulum in the same quantity of human milk is but one fifth as large as that of cow's milk, this difference, which is solely one of compactness and solubility, cannot fail to influence the digestibility of the two secretions, and explains at once why even moderate quantities of undiluted cow's milk are liable to overtax the digestive apparatus of the infant. (Leeds, Starr, etc.) In addition to this, and perhaps greater in importance, is the fact that human milk from a healthy subject rarely contains any micro-organisms, while cow's milk is never free from bacteria and may, moreover, be the vehicle of infectious germs and other morbid agents. Apart from the fact that unscrupulous dealers not infrequently lower the nutritive value by skimming or watering the milk, Dr. Busey and myself in a joint contribution have elsewhere pointed out how the quality of the milk may be impaired by improper food and care of the animals, and how the milk may produce mischief if derived from animals while being treated with strong remedial agents, or as the product of diseased animals, especially those suffering from inflammatory lesions of the udder, tuberculosis, and other communicable diseases. We have collected 138 epidemics of typhoid fever, 74 of scarlet fever, and 28 of diphtheria, which have been caused by infected milk, and indicated the various ways by which it is possible for disease germs to be carried in this way. Permit me to direct your attention to a very common milk fault, which may be considered a source of constant danger in infant-feeding and perhaps the most important factor in swelling the mortality rates of our helpless babes.

Every consumer of milk has doubtless observed the presence of more or less foreign matter found at the bottom of the vessel or bottle in which it is kept—indeed, it is a matter of such common occurrence that it hardly excites our attention. Professor Soxhlet was perhaps the first to point out that these deposits are largely made up of excrementitious matter from the cow, which, adhering to the udder of the animal, gained access to the bucket in the act of milking. Professor Renk, of Halle, brought this subject to the attention of the Section of Hygiene at the International Medical Congress in 1890, and few of his audience are likely to forget the valuable object-lesson presented by him, consisting of filtrates of milk samples from different German cities, each representing the amount of filth contained in a liter of milk, and furnished at once a

positive index of the degree of cleanliness observed at the various milk farms. The average weight, *dried* at a temperature of 212° Fahr., of these sediments was 3.8 mgrs. at Leipzig, 9.0 mgrs. at Munich, 10.3 mgrs. at Berlin, and 12.2 mgrs. at Halle. These filtrates were so disgusting in appearance that we were not disposed to accept them as a standard for American milk, and with the courteous consent of the Health Officer, Dr. Woodward, Professor Hird prepared filtrates from twenty-four specimens of Washington milk, taken at random, with the result that they presented even a greater amount of impurities, weighing all the way from 5 to 30 mgrs. per pint or quart; and as fecal matter contains about 85% of moisture, the weight of undried filth in the maximum specimen would have been about 180 mgrs. per quart.

Now, it is not at all likely that the average American housewife would permit any one to throw this amount of filth into her milk-pitcher, and yet, practically, we suffer it to be done, and there is no law to prevent it. If these sediments are subjected to microscopic examination, we will find that they are composed of epithelial *débris*, hairs of the cow, excrementitious matter, vegetable cells and fibers, organic and inorganic dust particles, bacteria, fungi, and spores of every description; fully 90% of the bacteria found in such specimens are fecal bacilli, all of which is not only disgusting, but also extremely suggestive of danger. We know that the number of micro-organisms in such milk is largely increased, and bacterial development and consequent decomposition are materially hastened, in such a medium. Dr. Plaut, of Leipzig, found, as a rule, that in warm weather the so-called fresh milk delivered in the morning has already passed the period of incubation and is unfit for use by young children, on account of the germ development, and of 47 infants whose milk-supply was carefully investigated by him, 18 developed digestive disorders and 6 died.

The greatest danger from milk of this class is the possible presence of tyrotoxicon and other bacterial products. Professor Vaughan believes that the former poison is developed by the growth of a germ, which, under favorable conditions, multiplies very rapidly. The presence of the very filth referred to, a summer heat, and the pernicious habit of placing the milk before cooling in covered cans or bottles, perhaps dirty besides, constitute favorable environments for the production of bacterial toxins. The relation of this poison and of milk bacteria to cholera infantum and the summer diarrhœas in bottle-fed children, is gaining ground and will doubtless result in a great reform of our milk establishments.

Cow's milk, no matter how great the care exercised in milking, contains the germs which bring about fermentation and decomposition. These bacteria of different species abound in the atmosphere whenever the temperature is above 60° Fahr., cling to the udder and teats, and even invade the lacteal ducts, and, finding there an excellent culture tube, multiply with great rapidity. Dr. Schultz has shown that the first half gill or so of milk obtained from the cow may contain 1,360,000 germs per cubic inch, while the milk drawn later is free from bacteria; hence we may safely conclude that the bulk of these organisms get into the milk from external sources, such as the air and dust of the stable, the hands and clothing of the milker, the hair or udder of the cow, the hay and straw, and last, but not least, the water in which the milk vessels are washed, and with which the milk is not infrequently diluted.

Sedgwick and Batchelder have shown that, with special precautions on the part of the milkman, the number of bacteria in fresh milk may not exceed 500 to 1,000 per c.c., but when he uses the ordinary flaring milk-pail, with more or less rough disturbance of the bedding and shaking of the udder, as many as 30,500 have been counted in 1 c.c. When we recall the fact that these germs during the heated term multiply with alarming rapidity, so that the average sample of Boston milk contains as many as 2,300,000 bacteria per teaspoonful, many of which are capable of evolving poisons, we can readily appreciate how the ingestion of such milk may give rise to the so-called summer diarrhœas of infants and swell their mortality.

It has been proved, bacteriologically, that milk is not only a favorable culture medium for many saprophytic germs, but also for the germs of typhoid fever, erysipelas, tuberculosis, glanders, diphtheria, pneumonia streptococci, and other pyogenic organisms, and this fact alone points at once to the necessity of a rigid control of our milk-supply.

A review of the evidence on milk contamination, both in this country and in Europe, shows that the laws which have been enacted to protect the public deal largely with the prevention of milk sophistication, and even in this respect have fallen short of their aim. Indeed, it is doubtful whether legislation in matters of this kind is as effective as public education. The importance of a pure milk-supply was recognized as early as 1878 in connection with some of the milk-cure institutes in Germany. The system then originated has been improved by time and experience, and lately introduced into Boston, New York, and Philadelphia, and appears to offer, by trade competition, the best solution of an important problem. Those of you who are familiar with the surroundings of our milk farms and the habits of the average dairy employ  s need no arguments for the necessity of sanitary reform. No family ever thinks of employing or keeping a cook afflicted with a communicable disease, and yet not the slightest restriction is placed, or question asked, about the persons who handle our milk-supply, which is notoriously one of the most sensitive and susceptible articles of food to contaminating influences. The absolute necessity of such milk laboratories is based upon the following facts:

1. It has been demonstrated that milk may be moribific by reason of an abnormal number of ordinary milk-bacteria and the presence of saprophytic germs capable of producing toxins, such as tyrotoxin, resulting in cholera infantum and other gastro-enteric diseases.

2. Milk may be rendered unfit for use by reason of improper food and care of the animal, or while the animal is being treated with arsenic, copper, iodine, lead, mercury, tartar emetic, aloes, atropia, colchicum, croton oil, senna, strychnine, salicylic acid, turpentine, veratrum viridis, and other remedial agents.

3. Milk itself may be moribific as the product of a diseased animal. Dr. Busey and myself have elsewhere pointed out that inflammatory conditions of the udder and teats, especially the condition known as garget, are doubtless responsible for a large number of cases of pseudo-membranous diphtheria and other septic infections. The milk of animals suffering from acute specific enteritis, puerperal and other septic fevers, foot and mouth disease, cowpox, anthrax, pleuro-pneumonia, rabies, and tetanus has also been known to prove injurious to the consumer.

4. It has been proved by Ernst, of Harvard, that three out of twenty-five samples of Boston milk transmitted the germs of tuberculosis in the animals experimented upon, and Dr. Fries found that the ordinary market milk of Copenhagen proved infectious in six out of twenty-eight rabbits, showing a corresponding degree of danger to delicate infants, and of which Dr. Busey and myself have collected a large amount of clinical evidence.

5. Milk may acquire infective properties after it leaves the udder of the animal, in support of which Dr. Busey and the writer have tabulated 138 epidemics of typhoid fever, 74 of scarlet fever, and 28 of diphtheria, the analysis of which showed that the poison may reach the milk by soakage of the germs into the well water with which the utensils are washed, or by the intentional dilution with infected water; that the infection can be conveyed by animals wading in sewage-polluted water, or by the dairy employ  s acting as nurses, or suffering themselves from some mild infection while continuing their usual duties, or are convalescents from the disease; that infection has taken place through the agency of scrubbing-brushes, flies and other insects, exposure of the milk in sick-rooms, or washing the patients with the same cloth used in wiping the dairy utensils. Surely this is sufficient evidence, enough to show that something should be done to protect the public; and I believe this can best be accomplished by encouraging the establishment of milk depots, like the Walker-Gordon Laboratory of Boston, and of which Dr. T. M. Rotch, of Boston, and Dr. R. F. Taylor speak so approvingly:

"The farm and herd are under the absolute control of the laboratory and are used for laboratory purposes only; the cows, their food, their stables, their pasture, and their drinking water are subjected to the frequent, paid, critical examination of the best veterinary surgeon that can be procured in Boston. The dairymen dress in white suits before milking, having each previously had a bath. The milk-pails are of glass, and the milk, after being aerated and cooled to about 44   Fahr. in a tank of ice and water, is delivered at the laboratory in Boston within four hours after the milking. The average and almost stable analysis of this original milk shows a percentage of:

Fat.....	3.90
Milk-sugar.....	4.30
Proteids.....	4.00
Salts.....	0.66
<hr/>	
Total solids.....	12.85
Total liquids.....	87.15

"At the laboratory a ventilating engine keeps up a constant change of air, and a hose keeps the enameled brick walls and stone floors wet to prevent contamination of the milk from dust, while it is being modified.

"The whole milk, after being pasteurized, passes through a Stockholm separator, which makes 6,800 revolutions a minute, and yields a cream of an almost constant 16% fat. It not only does this, but it removes all dirt that, from unavoidable causes, has gained access to the milk, thus yielding a clean skimmed milk practically free from fat, only 0.13% remaining.

"The modifier has, as a result, stable component parts of the original milk to work with, made up by analysis as follows:

	Fat.	Sugar.	Proteids.
Cream giving.....	16.00	4.00	3.60
Skimmed milk giving.....	0.13	4.40	4.00

"In addition to this, the modifier has a 20% solution of sugar of milk, freshly prepared with distilled water each day, and is therefore able to put up correctly a prescription which calls for certain percentages of fat, sugar, and the albuminoids. After copying the formula or prescription in a book kept for that purpose, the 'modifier' picks up a basket with as many compartments as meals are ordered, and fills each compartment with a tubular bottle holding the number of ounces ordered for each feeding. After mixing the ingredients *en masse*, as ordered, each bottle is filled and the basket passed to the stoppler, who plugs it with cotton. The whole is then pasteurized for half an hour, and, after proper labeling, the basket is ready for delivery. The delivery-wagon is divided into two compartments: the back, which is lined with zinc and easily cleaned, is for the fresh milk and baskets, and the front for soiled tubes, baskets, etc., which are sterilized at the laboratory before being taken into the modifying room." (R. F. Taylor.)

For a long time it was assumed that the composition of human milk varied with the age of the child, but Professor Leeds's long series of analyses show that after the function of lactation is once fairly established, the composition of woman's milk remains practically the same; and while the child receives more nutriment, day by day, it is in consequence of larger doses, rather than of a stronger quality. This is quite in harmony with reason and common sense.

Now if we wish to order a humanized milk as prepared at these laboratories, say for a child one month old, we would order the following mixture:

Cream.....	13vi	180
Milk-sugar solut. 20%.....	3vi	180
Skimmed milk.....	3ivss	135
Lime water, 1-20.....	13i	30
Distilled water.....	13vi	180

This is divided into twelve feedings, 2 ounces each. As the infant grows older, the intervals are lengthened and the doses increased. A child from two to five months old should receive eight feedings of 4 ounces each, and a strong child from five to eight months old may receive from 6 to 7 ounces at each of the eight feedings, according to the indications, which are best studied by the weight chart. Professor Rotch uses lime water for the purpose of partially neutralizing the acidity of the gastric juice, in consequence of which the casein coagulates more slowly and the formation of firm, undigestible curds is thus prevented. Professor Leeds, instead of lime water, strongly recommends the addition of peptogenic milk-powder, which is a preparation of pancreatic lactose and alkaline milk salts, originated by Fairchild Brothers & Foster, of New York.

There is nothing strained in the requirement of an ideal milk-supply,

as good and sufficient reasons have been given, and by means of which we may hope to obtain such a standard of milk as will not only effect a decided reduction in infantile mortality, but will render the dissemination of infectious diseases through the milk-supply a matter of history only. Apart from these advantages the proper way to manufacture condensed milk suitable for infant-feeding is to modify the milk before evaporation, a plan which, as far as I know, has not been attempted and is urgently called for.

In the meantime, it will be well to educate the public in the matter of milk sediments, which can readily be seen at the bottom of the bottle after standing a few hours. If we tell our dairyman the source of this pollution and how it can be prevented, something will be accomplished. No milk-supply is absolutely safe without pasteurization; and for infant-feeding, until we can do better, I advise the following combination recommended by Professor Reeds:

Milk	$\frac{1}{2}$ pint	240
Water	$\frac{1}{2}$ pint	240
Cream	2 ounces	60

Peptogenic milk-powder, one large measure. This mixture should be placed on a hot range or gas stove, and with constant stirring slowly heated for ten minutes to bring it to the boiling-point; it is then removed and quickly cooled, and should be kept on ice and again pasteurized before feeding. While milk thus prepared can never take the place of breast-milk from a healthy mother, it is very near in all respects to human milk and is perfectly sterile, so far as the ordinary disease germs are concerned.

Prevention of the disease is perhaps the central idea and object of sanitarians, but as hygiene also deals with the art of improving health, the question of a pure milk-supply is important in the feeding not only of infants, but also of the sick and invalids, and I trust, therefore, one of general interest to the profession.

V. THE GERM-THEORY OF DISEASE, AND DAIRY BACTERIOLOGY.

Since I have said a good deal about disease germs and the influence which milk plays in their proliferation and dissemination, it seems desirable, for the benefit of the lay reader, that a brief résumé of our knowledge of the causes of infectious diseases¹⁸ should be given, with the hope that it may not only explain many obscure points, but also furnish a clearer conception of the various forms of micro-organisms which are of special interest to every one engaged in the dairy business.

Not many years ago, it was assumed that the infectious diseases were caused by a miasm. A miasm, in the minds of those physicians, constituted some hypothetical matter formed outside of the system, which contaminated the air and gained admission in respiration, and then produced pathological conditions. Moscati tried over a hundred years ago to demonstrate the character of malaria to the senses by condensing the moisture of the air over rice fields and marshy districts; and though certain organisms were found, all efforts proved useless to con-

nect them with the disease as a causative factor, and thus the real nature of a miasm remained unexplained.

Another class of physicians assumed that many of the infectious diseases were caused by a contagium, by which they understood a specific morbid material generated within the body of persons affected with a certain disease, and capable of producing the same disease in others. This contagium was presumed to be communicable by immediate or mediate contact; but they failed to isolate the various specific agents or to demonstrate them to our senses.

About fifty years ago, Donne first demonstrated the presence of vibrios in syphilitic pus. In 1840, Henle¹⁷ ventured the opinion that the morbid matter of all infectious corpses was of a living organized character; and in order to determine whether the cadaver poison was produced by micro-organisms, he strongly urged to search for such organisms in the bodies of those affected with infectious diseases, and, if possible, to isolate them and establish their respective characters. This awakened a most earnest desire to determine whether or not organisms could be found in the bodies or excretions of infectious patients which might be the carriers or agents of the respective virus.

Very soon after this announcement, Davaine¹⁸ discovered the cause of anthrax; he found in the blood of animals suffering from splenic fever, certain rod-shaped organisms, which, in 1855, were confirmed by Pollender¹⁹ and Brauell.²⁰ These observers also demonstrated the fact that the blood of such animals inoculated into other animals produced the disease in question, and the blood of animals thus inoculated likewise contained the peculiar rod-shaped organisms. Pasteur,²¹ in 1877, finally proved that inoculation of blood, which had been freed from these organisms, failed to produce anthrax. This led to the natural conclusion that there was a causative relation between these rod-shaped organisms and the disease in question.

In the beginning of the seventies, Waldeyer, v. Recklinghausen, Weigert, and others, discovered a number of microparasites in the internal organs and wound secretions of various surgical infectious diseases; and in 1876 Koch²² published his researches on the etiology of splenic fever and anthrax, and presented the life-history of the *Bacillus anthracis*, which is one of the many varieties of bacteria.

The simple methods employed by this author in the detection and cultivation of disease germs resulted in the discovery of many other pathogenic bacteria, viz.: the tubercle bacillus of Koch; the bacillus of glanders, by Schütz and Loeffler; the lepra bacillus, by Hansen and Neisser; the coma-bacillus of cholera, by Koch; the micrococcus erysipelatis as the cause of traumatic erysipelas, by Fehleissen; the tetanus bacillus, by Nicolaier; the staphylococcus pyogenes-aureus, albus, and citreus, the cause of suppuration, by Ogston and Passet; the lancet-shaped pneumonia bacillus as the cause of pneumonia; the bacillus of typhoid as the cause of typhoid fever; Loeffler's bacillus as the cause of diphtheria, and the plasmodium malarie as the cause of malarial fevers. The evidence as to the cause of puerperal or childbed fever is conflicting, but points to the fact that it is due to a streptococcus infection, and it is believed that this microbe, as well as the staphylococcus, may give rise to diseases of the throat resembling diphtheria, and may also play an important rôle in the production of scarlet fever, blood-poisoning, abscesses, etc.

We may be disposed to smile with something less than contempt when we read of the importance attached to the microbic origin of certain diseases; but Koch has laid down *certain conditions*, upon the proof of which alone it can be asserted that *a particular microbe is the cause of a certain disease*. They are:

1. The micro-organisms must be found in the blood, lymph, or diseased tissues of man or animals suffering from, or dead with, the disease.
2. The micro-organisms must be isolated from the blood or tissues, and cultivated in suitable media outside the animal body, and these pure cultivations must be carried on through successive generations of the organism.
3. A pure cultivation thus obtained must, when introduced into the body of a healthy animal, produce the disease in question.
4. In the inoculated animal the same micro-organism must again be found.

It has been shown beyond a doubt, that some of the bacteria are the causative factors of communicable diseases, and this is a strong argument in favor of those in which the proofs are not yet conclusive. For obvious reasons the inoculation of pure cultures cannot always be applied to man; but in diseases which are interchangeable between animals and man, the complete sequence of proof has been established, and the successful inoculation of certain disease germs into healthy animals certainly warrants the assumption that similar results will take place in the human system.

What are bacteria? Prudden²⁸ tells us that they are so small that for a long time scientists were uncertain whether they belonged to the animal or vegetable kingdom; but it is now definitely settled that they are plants, and closely related to the algæ. Under the microscope, we see that the bacteria or shizomycetes are made up of vegetable cells containing slightly granular matter and surrounded by a somewhat denser envelope; they are so pale and translucent that they can only be distinctly recognized by staining them.

The bacteria may be spheroidal, ovoidal, rod-shaped, or spiral-shaped, and have been named according to their form.

All spheroidal bacteria are called *micrococci*, or simply "*cocci*." If they cling together and form chains, they are called *streptococci*; if they are grouped together in a rather irregular manner, like a bunch of grapes, they are called *staphylococci*.

Of the *rod-shaped bacteria*, the most common genus is called *bacillus*. If they are rather slender and delicate, they are called *leptothrix*. If they have the form midway between the round and rod-shaped bacteria, they are spoken of as *cocci-bacilli* or *cocci-bacteria*; the spiral or corkscrew bacilli are called *spirillæ*, and the curved bacilli are spoken of as *coma-bacilli*.

Reproduction. Like all living forms, bacteria are able to reproduce, provided they find a suitable soil; they need warmth, moisture, carbon, nitrogen, and salts, and quite a number oxygen also. The majority cannot exist in highly acid nutrient fluids, but prosper best in neutral and faintly alkaline media. It has also been demonstrated that they vary considerably with regard to their food; some flourish in certain media, where others find it hard to live. The majority of germs develop best at a temperature between 86° and 95° Fahr., but may

grow at a much lower temperature. When these favorable conditions are present, the process of reproduction is so rapid that a single germ, by growth and subdivision, may give rise to over sixteen millions of similar organisms within twenty-four hours; they multiply either by transverse fission or by spore formation. In fission the microbe divides into two parts, each of which lives and divides in its turn; others divide into three parts simultaneously; some forms, however, do not fall apart, but cling together, forming threads or chains of varying lengths, or clumps or masses.

In the spore formation we have to deal with internal spores and joint spores. In the former, the protoplasm is seen to contract into one or more refracting bodies, called spores, the membrane of the bacillus breaks up and liberates them, and they germinate into new bacilli. In joint spores, the entire cell gets detached and becomes transformed into a spore, which is capable of germinating some time afterwards.

The vitality of some bacteria is destroyed at the freezing-point, while others remain alive, even in ice, for long periods. The spores are more resistant to the influence of heat and cold, but exposure to a temperature of 250° Fahr. is quite likely to kill all forms of bacteria and their spores.

Saprophytic and Parasitic Bacteria. When the bacteria derive their food from dead substances, they are called *saprophytes*; if they prey upon some living organism, they are called *parasites*; and if they can only live upon the latter, they are termed *obligate* parasites, and if they can live also upon a dead matter, they are distinguished as *facultative* parasites. Disease germs are classed with parasites, since they multiply in the system. While many of the saprophytic germs may also produce disease, the majority are harmless and subserve many important and useful purposes in nature, as in the process of fermentation, such as lactic fermentation, ripening of cheese, etc.; they also play an important rôle in oxidation, nitrification, and putrefaction, where they destroy dead matter by feeding upon it, and split it up into simpler compounds, which can be more readily absorbed by vegetable or animal cells.

In the *Cultivation of Bacteria*, some interesting observations have been made. It would appear that wherever varying forms of bacteria are growing together a struggle for existence begins. The hardy and rapidly growing bacteria struggle with their weaker neighbors, and the weaker, as usual, succumb.

Thus it has been observed that the bacteria of fermentation and putrefaction furnish a material which poisons neighboring disease-bacteria. But such an antagonism does *not always* exist, for many varieties appear to grow together, while others prepare the way for a succeeding race, and often one species adapts itself to the conditions which brought about the extinction of its predecessors. (Prudden.)

Bacteriological studies have also shown us that, as the bacteria grow, they set free various chemical compounds—the result of their own life processes—chief of which are the ptomaines; they also liberate some of the amido compounds of the aromatic series, and ammonia, taurin, fatty acids, hydrogen sulphide, carbon dioxide, carburetted hydrogen, and other stinking gases not yet determined.

The subject of *ptomaines* is to us of special importance, because it is believed that these alkaloids, closely resembling the vegetable alkaloids

in chemical and physiological properties, produce the real mischief in the human system.

Quite a number of ptomaines have been discovered, and we know to-day that the cadaver poisons, such as *cholin*, *neuridin*, *neurin*, *cadaverin*, *putrescin*, etc., are the products of bacteria. Ptomaines have also been demonstrated in decomposing milk, cheese, meat, and fish.

Attention has been called to the poisonous effects of tyrotoxicon in milk, cream, cheese, etc.; and the cases of sausage-meat, mince-pie, and fish poisoning are usually caused by the rapid proliferation of saprophytic germs in these articles of food and the production of similar poisons. A matter of even greater interest to us is the fact that these so-called ptomaines or toxins have also been discovered in the culture fluids of certain disease germs. Thus, *cadaverin*, first demonstrated in the human cadaver, has been found in connection with putrescin in pure cultures of the cholera bacilli. And it is believed that the symptoms of cholera are produced by these poisons; for when introduced into animals, violent inflammation and necrosis of the intestinal mucous membranes result.

Typhotoxin has been obtained from pure cultures of the typhoid bacillus; this alkaloid, when injected into animals, produces inability to control the voluntary muscles, and excites increased flow of the salivary and intestinal secretions.

Another ptomaine, called *tetanin*, has been demonstrated from the cultures of the tetanus bacilli. This alkaloid, when injected into animals, produces clonic and tonic spasms—in fact, the symptoms of tetanus.

The recent researches by Koch as to the discovery and effects of *tuberculin* and Behring's diphtheria antitoxine are too well known to require special notice.

The admirable methods of Brieger, employed in the detection of ptomaines, will doubtless succeed in demonstrating that such products are formed in all pure cultures of pathogenic bacteria, and this would, of course, materially enhance our knowledge as to the deleterious effects of these compounds on the system.

Indeed, it would seem that the time is not far distant when we can say that certain bacteria invade the system. These develop, under favorable conditions, in sufficient number to produce, by their own life-processes, certain ptomaines, which, in turn, cause a train of toxic symptoms not unlike those of the vegetable alkaloids, or substances usually defined as poisons.

The Habitat of Bacteria. From what has been said it will be readily understood that bacteria are widely scattered and are found wherever organic life exists; in fact, they are present in all the media with which we come in contact; *i. e.*, in the air, water, soil, food, the wastes of human life, in the excretions and secretions, on the surface of man, animals, plants, etc. This, however, is not always the case, since many of the disease germs select only certain localities or media. Disease germs have been found in the following abodes:

In the *open air*, so far only the staphylococci of pus have been demonstrated.

In the *air of rooms*, the bacillus of pneumonia, of anthrax, and of tuberculosis, and the micrococci of pus and erysipelas have been isolated.

In the *water-supply*, the bacillus of cholera and of typhoid fever have been demonstrated.

In the *soil*, the bacillus of anthrax, of typhoid fever, of tetanus, and of malignant œdema have been found.

In *articles of food*, the bacilli of anthrax and tuberculosis, and the staphylococci of suppuration have been found in the milk and meat of diseased animals.

In *clothing*, the staphylococci of pus, the bacilli of anthrax and malignant œdema have been demonstrated, and there is reason to assume that the germs of all diseases conveyed in the air can also be carried in clothing.

It has also been shown that the *walls, floors, and ceilings of our habitations* may harbor disease germs. The pneumonia bacillus has been found in the ceiling spaces, the tetanus bacillus in mortar, and the tubercle bacillus on the walls, floors, bedsteads, and in fly-spots.

The *surface of our body* harbors many bacteria, both harmless and pathogenic. They are especially numerous in the armpit, between the toes, and in the dirt of the finger-nails. Mittmann²⁴ demonstrated no less than seventy-two varieties of bacteria in nail-dirt. Of the pathogenic forms, the micrococci of pus and the tubercle bacillus have been demonstrated in nail-dirt.

The pus-producing organisms have also been found *on the surface of the skin*, especially in persons afflicted with abscesses, boils, pustules, and other skin diseases. It is quite likely that the bacilli of cholera and typhoid fever will be found on the skin of persons soiled with dejecta, however slight, and that the scales of the epidermis contain the carriers of scarlet fever, smallpox, measles, erysipelas, etc.

In the *mouth and saliva* there have been found four different bacteria, capable of producing septicæmia in animals; also the streptococci of diphtheria and the bacilli of tuberculosis and pneumonia, not to mention the *Oidium albicans*, which belong to the fungi, as the cause of thrush. (Miller.²⁵)

In the *mucus* of the respiratory passages, the bacilli of pneumonia and tuberculosis have been isolated; also, Fränkel's and Weichselbaum's pneumo-cocci. In *vaginal mucus*, the *Oidium albicans*, the staphylococci of pus, and the streptococci have been found. (Winter.²⁶)

In the *intestinal contents*, the bacilli of cholera and typhoid fever, and it is assumed that the carriers of dysentery and tuberculosis are also present.

The *blood and internal organs*²⁷ of healthy individuals are free from micro-organisms. In disease, the bacillus of typhoid fever has been found in the blood and spleen; the bacilli of anthrax and tuberculosis have been demonstrated in the blood and various internal organs; the same is true of the streptococci of diphtheria. (Fluegge.²⁷)

Normal *urine* has been found to be quite free from germs, but bacteria have been demonstrated in certain diseases of the bladder and embolism of the kidneys.²⁸

The *cutaneous perspiration* is believed to be free from microbes; if found, they are probably derived from the skin.

The *exhalations* of healthy and diseased persons, even the breath of consumptives, have been found to be free from bacteria. But more remains to be done in this direction, as there are many infectious diseases which are doubtless in their first stage communicated by the exhalations of the patients.

Channels of Infection. Having indicated, briefly, where the disease germs have been found, it will be readily inferred that the air, water, soil, and articles of food are the principal media for their dissemination. Apart from these, clothing, bedding, and personal effects are common means of spreading infectious diseases. Man himself is often the cause of spreading disease germs. This is especially true when he mingles with the public, as in many mild cases of typhoid fever, and other diseases of a mild type, not to mention the spread of scarlet fever, measles, smallpox, etc., by patients, convalescents, and infectious corpses.

Perfectly well people may carry the germs in their clothing, or about their person, and infect some distant locality. One of the severest scarlet fever epidemics I ever encountered was due to a man who came for me on horseback, some sixty-five miles, to see some scarlet fever cases. He slept that night on a pallet made at his sister's house. The next day a little child, 18 months old, played on the bedding, and in less than ten days that child developed scarlet fever, which subsequently invaded almost every family in the town.

Insects, especially flies, are doubtless frequently the cause of spreading disease germs; they are usually present where the existence of germs may be suspected, and feed on the material likely to contain them. As a matter of fact, Celli,²⁹ of Rome, in 1888, demonstrated that the bacilli of tuberculosis, of anthrax, and of typhoid fever as well as the micrococci of pus, retain their virulence and power of propagation after passing through the intestinal tract of flies. Spillmann³⁰ and others have demonstrated that flies which were caught whilst feeding upon the sputum of consumptives, contained invariably vital specific bacilli, and Hoffmann³¹ not only confirmed these observations, but also found them in the fly-spots on the walls of rooms of phthisical patients.

Disease germs, like other seeds, must have a suitable soil for their growth. We have seen that disease germs are widely distributed, and the channels for invasion of the system are also numerous, and the wonder is that more persons do not contract disease. This shows that invasion of the microbe alone, is not sufficient to produce the disease, because this can take place often enough, but that, in addition to the germ, we must also have a suitable soil for the proliferation of the seed, and this we call predisposition.

What constitutes predisposition? Is it a weakness of the organism, a diminished power of resistance, or a peculiarity of the tissues—more especially of the tissue cells—which places them at a disadvantage in their struggle against the invasion and effects of these germs? Is it the addition or subtraction of a certain something in the blood, which furnishes the proper food for their growth? These are difficult questions to answer, but we will sum up the existing views on this subject.

In the first place, it is suggested that this predisposition in many persons amounts to only *simple tears, abrasions, or alterations of the skin and mucous membrane*, which would favor the invasion of the germs. A scratch of a pin or the puncture from a shoe peg may permit of the inoculation of the germs, which give rise to septicæmia or blood-poisoning. It is also held that the peculiar susceptibility of persons suffering from whooping-cough and measles, to tuberculosis, is due to the catarrhal condition and alteration of the epithelial layer of the respiratory tract, which favors the invasion of the tubercle bacilli; for

similar reasons the delicate mucous membranes of anæmic and scrofulous subjects are believed to favor the invasion of these germs. This is highly probable, when we consider that only the delicate mouths of children are susceptible to the effects of the *Oidium albicans*. Loeffler has also shown that the vagina of young guinea-pigs favors the inoculation of his diphtheria bacilli more than that of older animals.

Functional derangements of the stomach appear to play an important rôle in predisposition. Thus we know that normal gastric juice destroys the bacilli of cholera; but if the fluid be only faintly acid, neutral, or alkaline, this protection ceases, and the germs will reach the intestines and proliferate. This is doubtless true of many other germs.

For a time at least it was believed that the leucocytes assumed the rôle of defenders of the body against bacterial invaders—that, according to Metschnikoff,³³ they are phagocytes in this, that they either swallow and digest the bacteria, or surround them so closely as to cut off their oxygen and food-supply, and thus kill them. According to this theory, which was based on the fact that many dead bacilli were found in the bodies of leucocytes, an animal whose white blood-cells can successfully battle with and eat up a given species of bacteria, enjoys immunity from its deleterious effects; if, on the other hand, they are not strong enough to resist them, the battle is lost and the way is open for the spread of the infecting germs.

Now, while it cannot be denied that bacteria have actually been found in the bodies of leucocytes, it does not follow that they were taken up alive and destroyed by these cells; and until this is shown, no proof exists that their action toward the bacteria differs in any way from that toward other dead matter which they absorb or transport. This has been well presented by that indefatigable bacteriologist, Dr. Prudden, of New York.

Indeed, recent experiments appear to indicate that, after all, "it is the blood serum which possesses, in different degrees in different animals and in varying potency with the different bacterial species, a most marked germicidal power"; and this same observer has proved that a similar germicidal power resides in fresh, human, non-inflammatory transudations. In his opinion, "this power is not directly associated with the formed elements of the blood or transudates, but is in some way dependent upon their albuminoid constituents, and that this singular and apparently most significant capacity of the body fluids is intimately associated with that complex condition which we call life."

Whatever the exact rôle of the blood may be, the influence of a healthy condition of this fluid cannot be questioned. If healthy blood offers a natural defense, impure blood would constitute a prominent predisposing factor; and the average layman may, after all, not be very wrong when he talks to us about his "blood being out of order."

We know from clinical experience, that bad food, impure air and water, and the absorption of putrid gases formed in the intestinal tract, general mal-nutrition, physical and mental exhaustion, fever, anxiety, etc., predispose to a number of infectious diseases; and it is not unreasonable to assume that these factors, apart from producing an alteration of the blood, also tend to lower the vital powers of the system, and necessarily diminish the power of resistance to bacterial invasion and their products. Wyssokowitsch's experiments have shown that the same bacilli, which under normal conditions of the blood were rapidly

destroyed, at once began to manifest their pathogenic effects under the influence of a ptomaine poison.

In the light of clinical experience, the existence of an individual predisposition to infectious diseases cannot be questioned. We also know that this may be congenital and acquired; and in our present state of knowledge, we may assume that a vulnerability of the tissues and tissue cells exists, which renders the system peculiarly susceptible to the invasion of certain germs, and the particular form of poison evolved during their life-processes.

It is no more difficult to account for inherited vulnerable anatomical elements to certain germs and their toxic products, than to explain the hereditary transmission of physical and mental peculiarities, and the many idiosyncrasies, to drugs, etc.

Immunity. Now, while we find a natural predisposition to certain diseases, we also observe a natural *immunity from certain diseases*. This has been ascribed by some to the fact that the avenues for the invasion of the microbes are so well protected that they cannot enter the system, or that the blood and character of the tissues render it a poor soil for the proliferation of the disease germs; but these are unsatisfactory explanations in many instances. We know there are mild and malignant cases of scarlet fever, walking cases of typhoid, and cases of a profound type, and we also know that some systems are peculiarly susceptible to the physiological effects of certain drugs, and others are not. For all such reasons, the writer is tempted to accept Arlong's explanation, that immunity is due to the inaptitude of certain organisms to feel the effects of ptomaines evolved by the microbes. According to his explanation, germs of infectious diseases may exist within the body, and the disorder they may give rise to may be absent; for infectious disease *does not exist merely* because some noxious micro-organisms have taken their abode in the system. They exist because functional or structural troubles are brought about through the agency of ptomaines. Of course, this explanation does not apply to *all* infectious diseases, for in some instances one attack affords no exemption from a subsequent attack; indeed, the susceptibility is rather increased than diminished. This is true of malaria, gonorrhœa, croupous pneumonia, and erysipelas.

The next question of practical interest is: *How is the disease brought about by the bacteria?* Some of the germs evidently remain, for a time at least, at the point of invasion and vicinity; here they grow, and as they grow, evolve the so-called ptomaines, which, being irritants, often cause an inflammation, and this, as in erysipelas, malignant œdema, cholera, and some forms of pneumonia, may go on without suppuration. Other bacterial forms cause the white blood cells to gather about the parts, and as they accumulate more and more, the leucocytes die, and we have inflammation with suppuration, as in abscess, furuncles, impetigo, and syccosis; other forms of bacteria cause inflammation with necrosis, as in diphtheria, hospital gangrene, etc.

Another class of germs proliferate at the point of invasion, and subsequently invade the deeper tissues. This is probably true in tuberculosis. The bacilli of tetanus appear to proliferate at the point of invasion, spread along the nerve trunks, and finally enter the blood. The germs of syphilis and of leprosy are at first localized, and finally invade other parts. The virus of hydrophobia appears to develop first

at the point of invasion, extends along the nerve trunks, and subsequently invades the central nervous system and blood.

In some diseases, the disease germs are transported through the lymphatic spaces and vessels; in others, the invaders enter the blood, multiply there, and either remain or are deposited in different organs, or in all parts of the body; this may be said of the germs of anthrax, of typhoid fever, of acute miliary tuberculosis, and of the various acute eruptive fevers.

An exact *classification* would be entirely premature. The most we can say at present is, that the effects of pathogenic germs may be local and constitutional, the result of the absorption of their toxic products. Take, for example, a case of malignant scarlatina, where a child, in the midst of perfect health, is suddenly seized with vomiting, perhaps violent diarrhœa, with a remarkably frequent and small pulse, and such a sudden collapse that the pulse disappears within eight to twelve hours, the face and the extremities become cold, and death occurs in coma within twenty-four to thirty-six hours, without any eruption having appeared. Such symptoms point to paralysis of the cardiac center; and if these and all the various shades of brain symptoms in infectious diseases are not the result of ptomaine intoxication, it will be difficult to account for them in any other manner.

If it be true that infectious diseases are produced by the invasion of bacteria, their subsequent development, and the poisonous compounds evolved during their growth, the next question to be disposed of is:

How and under what circumstances does the disease terminate? We have seen that, under certain circumstances, the accumulation of disease germs and their products may be so great in the capillaries as to destroy the vitality of the part by cutting off the blood-supply. Now this may be a purely local condition; but let us figure to ourselves all the blood of the body charged with an organic poison, the capillaries obstructed with the invaders; and should this perchance take place in the same vital organ, we can at once appreciate how either or both of these conditions may produce death. If death does not take place under such circumstances, it is because at this critical moment something occurs which renders further proliferation of the germs and ptomaine production impossible, and recovery ensues, provided alterations of the tissues do not prolong the disease.

It was at one time assumed that the bacterial invaders were eliminated by the kidneys and other emunctories of the body. This appears to be true of the typhoid bacilli, although Wyssokowitsch's experiments indicate that, in animals, at least, they are not thrown off by the kidneys, unless these organs are themselves the seat of disease. Nor can we ascribe the destruction of the disease germs to the leucocytes alone, for it seems, if they were not vigorous enough to cope with them at the onset, it is not likely that their phagocytic power increased during the illness, unless it becomes a question of numerical strength.

It is possible that the ultimate means of recovery are brought about by different agencies in different diseases. In some, the parasites may perish because of the exhaustion of certain substances necessary for their growth; in brief, they die for want of suitable food. In others, they may die by the toxins of antagonistic species, or the very poison evolved by the bacteria may accumulate to such an extent as to prevent

their own growth, and they die self-poisoned. In still others, a tolerance of the system may be established to the particular poison, so that it no longer produces toxic effects. We see this wonderful tolerance almost daily illustrated in persons who have become the victims of enslaving drugs, taken in sufficient doses to kill a dozen other men.

What is true of the infectious diseases in man is equally true of certain diseases in animals, such as anthrax, blackleg, chicken cholera, diphtheria, foot and mouth disease, glanders, hog cholera, hog erysipelas, hydrophobia, influenza in horses, pleuro-pneumonia of cattle, rinderpest, swine plague, tetanus or lock-jaw, Texas fever, tuberculosis; and as these diseases are frequently very destructive and carry off entire herds, the subject is one of peculiar interest to the farmer, quite apart from the effects upon the milk-supply.

Much space has been devoted to the presentation of the germ theory of infectious diseases, because it is the only one by which we can rationally explain the occurrence of epidemics of typhoid fever, scarlet fever, diphtheria, etc., spread through the medium of the milk-supply. We feel perfectly confident that these and similar diseases are produced by a living germ, which is eliminated from the body in a living state, and may gain access into the system, among other vehicles, in the milk; and if the condition of the system affords a suitable soil for its proliferation, the disease in question is produced. If we reject the germ theory, we would indeed be forced to the conclusion that a disease like typhoid fever may be caused by fecal and putrescible matter, when present in milk or water in infinitesimal dilutions. A poison may produce sickness and even cause death, but it cannot infect, because it cannot reproduce itself.

Other Micro-organisms.

In addition to the bacteria, there are other micro-organisms which perform similar functions in nature; some of these are also pathogenic, and all are of interest in connection with the dairy industry:

1. *Molds.* Every one has seen the variously colored molds upon stale articles of food, especially jams and jellies kept in damp and dark places; they consist of fungi, are made up of vegetable cells surrounded by a cellulose membrane, and contain fatty matter and frequently a colored protoplasm; they grow in elongated threads, called hyphæ, which in their totality form the thallus, and when they develop upon a suitable soil, speedily grow into an entangled mass known as the mycelium. Some of the hyphæ are fertile and produce spores, mostly in the form of round or oval cells, which may develop additional mycelia. While it has been shown that such spores may develop in the system, especially in the kidneys, into mycelia, further fructification seems impossible. The elongated threads or hyphæ, however, have the faculty of penetrating even solid substances, as the teeth, for example. Fungi, like the bacteria, require a certain amount of organic food, such as nitrogen and carbon, also water, mineral salts, and air, but a very small amount of oxygen is sufficient; they flourish best in slightly acid media, and the majority perish in alkaline fluids. The bodies of warm-blooded animals do not favor their growth. Fungi and their spores show a remarkable degree of resistance to heat and cold, and are only destroyed at a temperature of 212° Fahr. and by steaming; but this can be more readily accomplished by various chemical agents. Some flourish

best at a temperature between 50° and 86° Fahr.; others between 86° and 104° Fahr.; while still others, unlike the bacteria, may grow at a temperature of 38° to 36° Fahr.

A number of the fungi form ferments, and may thus render insoluble substances soluble, but in their growth they do not set free any of the poisonous compounds known as ptomaines. Of the pathogenic fungi may be mentioned the *favus* fungi, or *Achorion Schoenleinii*, which causes a disease of the skin characterized by yellow umbilicated crusts. The *Trichophyton tonsurans* produces a disease erroneously called ring-worm; if it invade the scalp it leads to the destruction of the hairs in the form of rounded patches, and when it affects the hairy part of the face it is called the barber's itch. The *Microsporon furfur* invades the horny layer of the skin, where it causes yellowish spots and a furfura-ceous exfoliation, of which dandruff is a typical example. Indeed, a large number of skin diseases are caused by the action of parasitic fungi. One of the *Mucor* family, the *Mucor corymbifer*, has been known to invade the ear and cause violent inflammation of the canal and drum, not to mention the preliminary symptoms such as partial deafness, unpleasant noises, etc., which lasted for weeks. The *Penicillium glaucum* is found on Roquefort cheese—the greenish streaks seen in this cheese are masses of this mold—and is said to play an important rôle in its ripening. The growth of molds on the surface of some kinds of soft cheeses is encouraged. Species of the *Aspergillus* family are frequently present in milk, and have been known to cause gastro-enteric disorders, and some of these blue and black molds have been known to cause pneumonia in birds. The *Mucor* family (white mold) frequently invades milk and other articles of food, and produces diseases of the digestive tract.

2. *Yeast plants or fungi* are composed of round and oval cells, surrounded with a membrane, and grow in delicate, horizontal filaments, from which short, articulated pedicles take their rise; the uppermost cells of the pedicles germinate and produce new sprouts; they also require organic matter for food, such as nitrogen, carbon, together with water and mineral salts. While oxygen is not essential, they proliferate best under the free admission of air. The yeast ferments prefer an acid media and a temperature between 76° and 86° Fahr., while their activity usually ceases at the freezing-point. Sunlight does not arrest their growth, and agitation rather promotes it. These organisms are the active agents in the fermentation of beer, wine, and koumiss. Of the fungi, the *Oidium albicans* or *Oidium lactis* is frequently met with in milk, and is liable to produce pathogenic effects by attacking the mouth and digestive tract of infants, causing aphthous ulcers or thrush.

Protozoa. Since some of the infectious diseases have been attributed to this class of micro-organisms, it is desirable to indicate, at least, that they constitute the lowest animal sub-kingdom, and include the lowest and simplest forms of animal life. Their bodies consist either of a single cell, or of an aggregation of cells, each of which seems to retain its independent existence. The protozoa are divided into sarcodina, sporozoa, and infusoria.

The *sarcodina* are single cells of protoplasm, endowed with the faculty of absorbing nutriment, and also with motion by means of little shoots, which they can extend and retract; their usual habitat is the water—

fresh, salt, as well as stagnant waters; they are also found in slime, moist sands, the moss of trees, and in horse manure. Reproduction is accomplished by fissure into two or more parts; drying does not destroy their vitality. The amœbæ belong to this class, and Kartulis and Uplavici have shown that certain forms of amœbæ not infrequently found in impure water and contaminated food are the cause of dysentery.

The *sporozoa* are also composed of single cells, and are found to inhabit the cells of many animals. The sporozoa include the gregarinidæ, microsporidiæ, myxosporidiæ, sacrosporidiæ, and the coccidiæ. The latter are composed of ovoid or spheroid cells, and are of special interest to us, as they frequently infect the bodies of mollusks, birds, dogs, cats, rabbits, pigs; they have also been found in the organs, and in the blood, skin, muscles, and intestinal tract of man, and are reproduced by spore-formation. To this class belongs the *Plasmodium malariae*, discovered by Laveran, and which has been so constantly found in the blood of malarial patients as to be regarded as the cause of malarial fevers.

Some of the protozoa are believed to poison the animals which they infect, and the toxic symptoms sometimes observed after eating fish and other meats have been ascribed to their presence. Species of the *myxo-* and *sarcosporidiæ* have been found in the gullet, and in the flesh of fish and other animals; and such conditions as anæmia, paralysis, and skin eruptions have been attributed to their presence; but this entire field, while offering prospects for brilliant discoveries, has not been worked sufficiently to permit the formulation of any definite conclusions.

The Cultivation and Study of Bacteria.

It is of course well known that the bacteriologist, in the study of micro-organisms, cultivates them in different media, or soils, and sows them with the expectation of a crop, just as the farmer sows his seed or plants his potatoes. Instead of ordinary soil, he resorts to solutions of gelatine, beef extract, meat broths, milk, agar, potato, etc., and in order that he may not get a "mixed crop," he first sterilizes his culture medium, *i. e.*, renders it germ-free, by exposure to heat. The farmer does practically the same thing by rooting out the weeds and by proper cultivation of the soil. One of the most common culture media employed is a 10% solution of gelatine, mixed with beef-tea, pepton, and a little cooking salt, and then made neutral or *slightly alkaline*. If, however, we wish to cultivate the germs at a higher temperature than 60° or 70° Fahr., and many only develop at blood-heat, we have to employ a more solid substance, as the gelatine mixture would melt and scatter the bacteria instead of developing them in so-called colonies. For temperatures above 71° Fahr. we employ agar, derived from a Japanese seaweed, in a 1% solution, mixed with beef-tea and pepton, and treated as above. This makes a gelatinous, solid, and transparent mass.

These or other culture media are placed in glass test-tubes, about one third full, closed with plugs of cotton, and carefully heated, so as to kill all germs which may be present. The next step after sterilization and cooling of the media is their inoculation, which is done by introducing into the tubes with a platinum wire, previously sterilized by heating it to redness, a minute quantity of the bacteria-containing material (a drop of blood, milk, etc.). After which the culture-tubes are again

plugged with cotton and set away in a warm place or incubator until the fluid begins to get turbid, which is an indication of germ development. By a careful microscopical examination we can tell whether we have a *pure culture*, i. e., a growth or colony composed of one species only, or a "mixed crop" of several forms of bacteria growing in the tube. In the examination of milk and other liquids we must expect quite a mixture of bacteria, and it is very desirable to isolate them, with a view of studying each species, in separate tubes. This, at one time, was a very difficult task, but Professor Koch has overcome it all by a very simple method, called the "plate-culture."

Suppose we have a sample of milk, containing several varieties of bacteria, which we wish to isolate and study; the first thing to do is to mix, in a test-tube, a very small amount of the suspected substance, such as water, milk, etc., with a much larger quantity of the above described nutrient gelatine, rendered just fluid by heat (a temperature above 113° Fahr. must be avoided, as it may kill the bacteria which we are endeavoring to grow). The mixture is well shaken to insure equal distribution of the germs, and is poured in thin layers upon a glass-plate previously sterilized; the plate is now covered with a bell-jar to exclude the germs floating in the air and to prevent its drying, and should be kept at a suitable temperature. The gelatine or agar thus employed solidifies upon cooling, and the bacteria presently begin to grow. At the expiration of a few hours or days, we will observe upon this film, sometimes with the naked eye, sometimes only with the aid of the microscope, little spots or masses, each one consisting of hundreds or thousands of the organisms, developed from a single germ into a colony. It may happen that two or more of the original germs developed at the same point, and thus give us a "mixed colony," but this is not usually the case, and by examining the plate under the microscope we can see the different forms of the colonies; some have liquefied the gelatine around them, others have not; some are chromogenetic germs and are colored red, green, yellow, etc., while others are perfectly colorless; some have well-defined, smooth edges, others are fringed, jagged, etc.

The characteristics of the different colonies are so well defined that we have no difficulty in distinguishing them, and as each colony is composed of a distinct species of bacteria, we are not only able to count them, but, directly under the microscope, by means of the point of a sterilized platinum wire, they can be picked out, and sown into our culture media, with a view of getting a pure culture or clean crop. In this way, strange as it may appear, the different species of these very minute organisms can be *absolutely identified*; and, by counting the colonies in a definite volume of the gelatine, we can estimate the number of bacteria contained in a given liquid. When we have a pure culture of a particular germ, we can study its life-history, and determine the character of food and the degree of temperature best suited for its rapid development, and the maximum and minimum temperature necessary to kill it. We can also add certain chemical solutions to determine which of these, and in what proportion, constitutes the best germicide, a matter of great importance in disinfection and in the prevention of disease. The bacteriologist also cultivates them in very large quantities, and determines, by a chemical examination of the fluid, what poisons or compounds have resulted from their vital activity; and by experiments upon animals, he is enabled to study closely the

probable effects of these germs and their products upon man, and also upon other species of bacteria. In this way, too, the so-called *serum* and *antitoxine treatment* found its origin, which is based upon the assumption already referred to that recovery in some cases is due to the fact that the very poison evolved by the bacterial invaders has accumulated to such an extent as to prevent their own growth, and they die self-poisoned, while in some diseases the original invaders are killed by the toxins of antagonistic species. Serum therapy opens a new field, and time alone will show the results of a method which seems perfectly justified by laboratory experiments, and is especially applicable in the treatment of at least some of the infectious diseases, in which we probably can aid nature in her own method of bringing about a cure.

Milk as a Culture Medium for Disease Germs.

The labors of numerous bacteriologists leave no room for doubt that milk is not only a splendid culture medium for the ordinary and comparatively harmless milk bacteria, but also for disease germs. This is especially true of the germs of erysipelas, pneumonia, typhoid fever, diphtheria, glanders, and tuberculosis, and, in a more restricted sense, also of cholera.

Heim has shown that the bacillus of tuberculosis may remain alive in milk ten days old, and that this germ and the bacillus of typhoid fever may retain their vitality in butter. Indeed, Gasparini³³ found the tubercle bacillus still alive in potted butter one hundred and twenty days old, and Galtier³⁴ found them still living in cheese at the end of thirty-five days. Abbott³⁵ has shown that the germs of tuberculosis will not only survive, but actually proliferate in milk. While cholera germs may grow in perfectly fresh milk, and, according to Laeser,³⁶ remain alive in butter for four or five days, Cunningham has shown that souring of milk at once arrests the development of these germs. Professor Guillebeau³⁷ has discovered three different bacilli in milk derived from inflamed udders, and Adametz, Macé, and Hueppe³⁸ have described several kinds of micrococcus and streptococcus under similar conditions, which multiplied to such an extent that the gases caused the cheese to "heave." If these pyogenic or pus-producing microbes can do all this in cheese, what may the effects be in the human subject? To the writer it seems no longer a mystery that the milk from animals suffering with garget should be the cause of diphtheritic sorethroats, erysipelas, and other manifestations of a streptococcus infection; indeed, it is quite possible that a train of symptoms closely resembling scarlet fever may result from such an infection, not to mention the many cases of abscess, boils, and suppurative processes, as well as gastro-enteric disorders, which may be caused by such milk.

Normal Milk Bacteria. We are now prepared to say something of the micro-organisms which have been so constantly found in milk and dairy products, as to be considered normal milk bacteria, and they are not only of interest to the sanitarian, but also to the milkman, the butter- and the cheese-maker.

The Souring of Milk. We have already intimated that the curdling and acid reaction of milk, which takes place some time after milking, is brought about by the agency of bacteria. Lister,⁴⁰ in 1873,

found in milk several forms of bacteria, one of which was instrumental in the production of lactic acid, while others had different effects; he also found that this organism was quite common around the dairy, but not common elsewhere, even in the barn. Bacteriologists have made this subject one of special study, and, according to Professor Conn," over two hundred distinct types of dairy bacteria have been described, and we know now that lactic fermentation is caused not only by one, but also by quite a number of species of bacteria; they all proliferate in the milk, and set up a fermentation of the milk-sugar, which is converted into carbonic acid and lactic acid, and when sufficient lactic acid has been evolved, the milk coagulates, and, what is more interesting, the very bacteria which have brought about this change die self-poisoned in the product of their own life's processes, and other species begin their work in the medium thus prepared.

Among a number of lactic bacteria, Hueppe" describes one bacillus about $\frac{1}{25000}$ of an inch long by about $\frac{1}{22500}$ of an inch thick, which grows between 50° and 113° Fahr., but most rapidly at 95° Fahr. If introduced into sterile milk it produces uniform curdling within fifteen hours, provided the temperature is kept between 77° and 86° Fahr. He has also isolated two micrococci; and Marpmann, Krueger, and Grotenfelt" have described other bacteria which cause the souring of milk, though they may not act on milk precisely in the same way. So, for instance, Grotenfelt's *Bacillus acidi lactici* produces alcohol, as well as lactic and carbonic acids. Most of the lactic bacteria do not develop spores, and are generally killed by a temperature of 158° Fahr.

Where do these germs come from? Pasteur" called attention to the fact that milk from animals free from disease, and when drawn with a sterilized tube direct from the udder, is free from germs; hence, we may safely conclude that these organisms get into the milk from external sources, such as the air and dust of the stables, the hands and clothing of the milker, the hair or udder of the cow, the hay and straw, and especially from the milk-buckets. Von Freudenreich" points out, however, that the first half gill or so of milk obtained from the cow is particularly rich in germs, which he attributes to the fact that after milking a little milk remains in the lower part of the teat, where, owing to the large caliber of the lacteal ducts, it is not completely shut off from the exterior, hence readily infected, and the conditions being favorable a rich crop is produced before the next milking. Dr. Schultz" has shown that such milk contains some 1,360,000 germs per cubic inch, while the milk drawn later is free from bacteria. Professor Guillebeau" has demonstrated the importance of perfectly clean udders and hands by counting the number of bacteria under different circumstances. It has been shown by Sedgwick and Batchelder" that with special precautions on the part of the milkman, the number of bacteria in fresh milk may not exceed 500 to 1,000 per c.c., but when he uses the ordinary flaring milk-pail, with more or less rough disturbance of the bedding and shaking of the udder, as many as 30,500 bacteria have been counted in 1 c.c.

Dr. Bryce," of Toronto, has shown that milk which had been kept for several days in a cool place, and then contained 10,000 bacteria per c.c., was afterwards allowed to stand in a warm room some twenty-four hours, at the end of which time they had increased to 1,000,000 per c.c.

Rapidity of Germ Development. Von Freudenreich⁴⁴ exposed a sample of milk containing 153,000 bacteria per cubic inch, to a temperature of 59° Fahr.

	Bacteria per Cubic Inch.
1 hour after it contained	539,750
2 hours after it contained	618,250
4 hours after it contained	680,000
7 hours after it contained	1,020,000
9 hours after it contained	2,040,000
25 hours after it contained	85,000,000

Other samples containing 391,000 bacteria per cubic inch were kept at a temperature of 77° and 95°.

Bacteria per Cubic Inch.		
	At 77° F.	At 95° F.
2 hours after	{ Plate liquefied at time of examination }	1,275,000
6 hours after		45,900,000
9 hours after		57,800,000
24 hours after		13,812,500,000
	13,702,000,000	

We can now appreciate why Professor Renk has found in the milk-supply of the City of Halle from 6,000,000 to 30,000,000 bacteria per c.c.—far exceeding the number usually found in the sewage of cities. Sedgwick and Batchelder⁴⁶ found the average number of germs in fifty-seven samples taken direct from the milk-wagons in the City of Boston to be 2,355,500 per c.c., whilst the average of sixteen samples taken from groceries in the same city was 4,577,000 per c.c.; the difference being one of time and comparative freshness. Loveland and Watson found in the milk of Middletown, Conn., from 11,000 to 300,000 of germs per c.c., and Russell in the milk of Madison, Wis., from 35,000 to 275,000 in April, and 380,000 to 2,000,000 per c.c. in May and June.

Thunderstorms not Directly the Cause of Souring the Milk. The popular belief that electric storms will sour milk is of course very widespread, but it has been experimentally proved, by discharging electric sparks over the surface of the milk, that electricity is not capable of souring it, and since we know that this fermentation is caused by bacteria, we justly infer that the same meteorological conditions which have brought on the thunderstorm have also hastened bacterial growth, and the observant farmer knows very well that if he cools his milk immediately after milking and keeps it in a cool place, it is not affected by thunderstorms, and that during sultry weather his milk, unless it is kept cool, is apt to sour without a thunderstorm.

Butter-making. The very germs which are so objectionable to the milkman, by souring his milk, appear to be of benefit to the butter-maker, who allows his cream to "sour" or "ripen" for a number of hours before churning, which, of course, means a rapid multiplication of the lactic-acid organisms, which in turn causes the souring of the cream; but these changes are not confined to this lactic-acid organism, but the warm temperature also develops other bacteria. Some of the very best butter is made from slightly acid cream. Such butter keeps and tastes much better, and the cream churns more readily and yields a larger quantity of butter, but its chief value lies in the superior flavor. For this reason the butter-maker is very apt to add a small quantity of slightly acid milk to the cream, and in order to have every day the

proper quantity of sour milk to act as a "starter," Von Freudenreich⁴ recommends the addition of two to four pints of sour milk to fresh, or still better, pasteurized skimmed milk, which will be just suited for the treatment of the cream the next day. It is of great importance that the milk thus added contain only such bacteria as produce not only proper ripening, but also an agreeable flavor. Both of these conditions are brought about by the action of bacteria, probably during the first stage of decomposition. We also know that some species of bacteria will produce foul-smelling substances, and the butter will acquire a disagreeable odor and taste. Storch,⁴ a Swedish scientist, was the first to assume that the butter aroma was due to bacterial growth, and endeavored to isolate the species producing the proper aroma. Whilst he failed, Weigmann,⁴ of Kiel, succeeded in finding such a microbe, and by ripening cream with pure cultures of his micrococcus, he gets butter of a uniformly excellent flavor and quality. For this purpose he cultivates his germ in milk previously pasteurized, and this he adds the following day to the cream to be ripened. Weigmann's coccus is probably not the only microbe capable of imparting a desirable flavor to butter, and the time will come when the cream will be separated from perfectly fresh milk with the centrifugal machine, inoculated with desirable cultures or ferments, when the ripening of the cream will result in uniform products of superior butter.*

Cheese-making. It is well known that rennet, a preparation usually made from the stomach of a calf, has the power of coagulating the casein of milk in a very short time, and this appears to be the only type of milk fermentation caused by an unorganized ferment. It would lead us too far to offer what has been written on the action of rennet on milk, but will simply say that the rapidity of its action depends upon the amount and quality of the rennet, and the temperature, and may be lessened by alkalies and increased by various salts. The active principle of rennet is a chemical ferment, a common product of bacterial growth, and is regarded as distinct from other digestive ferments; it is destroyed by a temperature of 158° Fahr., and acts best at about 95° Fahr.

Ferments of Casein. There is a large group of bacteria, all capable of curdling the milk, not by the formation of lactic acid, but by producing a substance which acts like rennet. Duclaux⁴ has described such a microbe, which, at a temperature of 98.5° Fahr., was able to curdle

* Since writing the above, Professor H. W. Conn, of Wesleyan University, has discovered a bacillus, named by him "Bacillus No. 41," which, while it is an acid organism, does not noticeably sour milk or cream. In the use of this germ, a large culture of the organism is added directly to the ordinary cream and the ripening is carried on as usual. The peculiar effect of this organism appears to be to add to the butter a flavor which the butter-maker describes as a "quick grass" flavor, such as is obtained in June butter. This agreeable aroma appears to be added to the butter in all conditions in which the experiments have thus far been tried. It has been tried, according to Conn, upon poor cream and upon good cream, upon fresh and stale cream, in creameries of the very highest character and creameries of a very much lower grade, and the verdict in all cases has been favorable to this method of inoculating cream. The ferments prepared by Conn are put up in such a form that they can be distributed to the creameries, and it is claimed that the butter obtained from the cream thus ripened retains its pleasant flavor for a longer time. Professor Conn very properly adds that "it is impossible to say how long any one of these special species of bacteria will hold its characters under the conditions of cultivation to which it is subjected. Bacteriologists have learned that the physiological characters of bacteria species undergo changes with continued cultivation. Possibly, therefore, the species now in use may lose their powers of producing good butter, and thus compel our bacteriologists to obtain others." * * * (Dairy Bacteriology, Bulletin No. 25, U. S. Dept. of Agric., 1895.)

thirty times its own weight of milk in eleven minutes, and one hundred and twenty times its own weight in two hours; and Professor Conn has obtained from pure cultures of another species a substance which acts like rennet. It has been conclusively shown that these and other organisms are instrumental in causing the ripening of cheese, and are therefore a necessity to the cheese-maker. Duclaux places these various microbes in a common group, which he calls "casein ferments." Cheese is absolutely worthless without the agency of these germs. New cheese is not palatable, it tastes like fresh milk-curd, and acquires its proper flavor only after weeks or months of bacterial action; and that this ripening is due to bacteria was proved by Adametz, who treated fresh cheese with germicides, and this cheese did not ripen. He also estimated the number of organisms present in cheese, and found them to be from 25,000,000 to 165,000,000 per ounce, which increased slowly during the ripening process. He also found at first many species present, but as the ripening went on, one species predominated over all others. These results have since been confirmed, and Dr. Schaffer and others have shown that cheese made from boiled milk, and, therefore, free from bacteria, will not ripen. Duclaux calls attention to an important fact, that his microbe (*Tyrothrix tenuis*) will resist, for a minute at least, exposure to moist heat of from 239° to 243° Fahr. Numerous species belong to the casein ferments, and but few have been carefully studied. Duclaux alone isolated ten different varieties, and the butyric ferments and many widely distributed microbes, like the hay and potato bacilli, and other soil bacteria, are believed to belong to this group. There is no doubt that the different flavors of different cheeses are due to the action of different species of micro-organisms, in the ripening, and the time may come when the cheese-maker will make use of fresh milk and inoculate it with various ferments, each of which will produce for him a definite quality and flavor of cheese, and thus insure uniform products, but so far all efforts to hasten or improve the ripening process by adding pure cultures have failed. (Conn.)

Abnormal Milk Bacteria. We have briefly considered the action of certain bacteria, which occurs with such uniformity as to be regarded a normal process; we have shown that while these bacteria are the enemies of the milkman and milk-consumer, they prove friends to the butter-maker and are indispensable to the cheese-maker. But as elsewhere, so in the dairy, we have normal and abnormal bacteria; for quite apart from the germs of infectious diseases, with which the milk may be contaminated in the manner repeatedly pointed out, we have to deal with micro-organisms, which produce not only "sick milk," "sick butter," and "sick cheese," but also, when consumed, "sick people." All these effects are primarily due to abnormal milk bacteria or organisms, and we can with considerable propriety declare that milk is liable to certain microbial diseases, and among the first to be considered are:

Abnormally Colored Milk. Milk may acquire abnormal color in consequence of germ development, and while the fungi and germs do not themselves give the color, Schröter believes that they develop various anilines, such as aniline blue, fuchsin, etc., from the casein, which is then imparted to the colonies and the milk. These colors, as may be inferred, occur usually in the form of patches upon the surface of the milk, and unless the latter is shaken do not impart a uniform color.

While the use of such milk has proved injurious to the consumer, there is comparatively little danger from this source, as few households would accept such milk, and the subject is, therefore, of greater importance to the producer of an unsalable article of milk.

1. *Blue Milk*. According to Parkes the *Oidium lactis* or *penicilium* are germ growths which produce a blue color in milk. Fuchs, in 1841, pointed out the probable cause, but was unable to prove it. In 1880, Neelson discovered a bacillus capable of coloring milk blue, but as Professor Hueppe was the first to study its life-history and accurately described the organism, it has been called "*Bacillus cyanogenus* Hueppe." This microbe is from $\frac{1}{25000}$ to $\frac{1}{2250}$ of an inch long and $\frac{1}{25000}$ to $\frac{1}{20000}$ of an inch thick, and possesses motile power; it does not liquefy gelatine. It does not develop a blue, but rather a dirty gray pigment in sterilized milk, hence the bacteria which are instrumental in producing lactic acid appear to prepare the way for the production of the peculiar pigment. The *B. cyanogenus* is destroyed by exposure for one minute to a temperature of 170° Fahr. The blue color usually develops in twenty-four to seventy-two hours.

2. *Red Milk*. If milk, when first drawn, presents a red color, it is probably due to admixture of blood, and not due to the action of chromogenic germs, as they require several hours to multiply and produce the red pigment. Quite a number of germs appear to have the property of imparting a red tint. Hueppe has described an organism, the *Bacter. lactis erythrogenes*, which is from $\frac{1}{25000}$ to $\frac{1}{17800}$ of an inch long, and from $\frac{1}{25000}$ to $\frac{1}{22500}$ of an inch thick; this bacillus appears to avoid the cream, but colors the skimmed milk, provided it is kept in the dark. It liquefies, and also colors gelatine red. The *Bacillus prodigiosus*, when present in milk, gives rise to the production of red patches—it is the same bacillus which imparts the red stain upon sliced raw potatoes.

The *Sarcina rosea*, described by Menge, multiplies upon the surface, and imparts to the cream layer a red color, which gradually permeates the entire milk; another *Sarcina rosea*, described by Schröter, imparts to the milk a brownish-red color. Another organism, belonging to the yeast fungi, discovered by Dr. Schaffer, and described by Demme, viz.: the *Saccharomyces ruber*, is believed to color milk and cheese.

3. *Yellow Milk*. Several varieties of bacteria are believed to possess the power of coloring milk yellow, but the best known is the *Bacillus synxanthus*, described by Schröter; it is a motile microbe, and curdles milk by means of a rennet-like ferment, but it afterwards redissolves the curd, and produces a yellow pigment.

Professor Conn says that the production of pigments in milk is not an uncommon occurrence, and that we have now knowledge of bacteria-producing pigments corresponding to all of the primary colors. In addition to those already mentioned, he refers to:

4. *Orange Milk*, caused by *S. aurantiacum*.

5. *Green Milk*, by *B. florescens*; and

6. *Violet Milk*, by *B. violaceus*.

The pigments, in most of these instances, do not appear very rapidly, and he considers that blue milk is the only dairy infection which attacks the milk rapidly, and produces in a short time a very prominent pigment, whilst the other forms may consume days or weeks, and are, therefore, of no practical interest, except to the bacteriologist or cheese-maker.

Abnormal Taste of Milk. 1. *Bitter Milk.* While different foodstuffs, and even the age of the milch cows, may have a tendency to render the milk bitter, it has been shown that the most common cause of this defect is the action of several species of organism. Not less than four have been described so far, viz.: Weigmann's bitter-milk bacillus, which is from $\frac{1}{1000}$ to $\frac{1}{10000}$ of an inch long and about $\frac{1}{2000}$ of an inch thick, and when inoculated in sterile milk imparts a very bitter taste within twenty-four hours; it does not multiply in cheese. Professor Conn isolated a micrococcus from *bitter cream*; it liquefies gelatine, is aerobic, and when inoculated into milk it produces a bitter taste. Duclaux has described a bacillus (*Tyrothrix geniculatus*) which renders milk, as well as soft cheese, bitter. Von Freudenreich found a micrococcus in very bitter cheese, which, when inoculated into milk, also produced a bitter milk; it differs from Conn's micrococcus in this, that while it also liquefies gelatine, it does not, like Conn's, make it stringy. These bacteria belong mostly to the group of casein ferments which develop from spores, and are therefore more resistant to heat; and it is believed that other species of the casein ferments are capable of making bitter milk. Vandenheydonck, quoted by Conn, reports an instance of bitter milk in a whole herd, produced by feeding to the cattle turnips washed in foul water; but as the milk of cows fed with turnips often tastes bitter, it is impossible to say whether in these instances a micro-organism is the direct cause.

2. *Soapy Milk.* Weigmann⁴ has discovered a bacillus capable of imparting to milk, within twenty-four hours after inoculation, a pronounced soapy taste, and thus explained the mystery of soapy milk. He also demonstrated this microbe in the straw of the bedding, and recommended not to feed straw to cows, nor to disturb their bedding during milking. This troublesome infection interferes with the churning of the cream.

Professor Conn refers to a *tainted milk*, which appears to be caused by a distinct species named *Bacillus fetidus*.

Abnormal Consistency of Milk. A *slimy* or *stringy* fermentation of milk is by no means uncommon, and occasionally produces great loss to dairymen; because such milk will furnish no cream, it cannot be churned, and is unfit for drinking purposes. The cause of slimy milk was for a long time a mystery, and attributed to disease of the udder, variations in the food of the cow, and differences in conditions surrounding the dairy, but we now know that it is another result of bacterial action, and that the infection is easily transmitted, and causes the slimy or stringy character within twelve or fourteen hours. Quite a number of species appear to possess this power; while some induce only a slight sliminess, others render it very tenacious, and one, described by Conn,⁴ renders the milk so stringy that it can be drawn into threads ten feet long. Some of the organisms render the milk viscid in their early growth, others only after several days, while still others first curdle the milk and then dissolve the curd into a slimy solution. In the manufacture of Edam cheese a stringy milk is artificially produced by Weigmann's streptococcus *Hollandicus*. Among the various microbes so far isolated, is a micrococcus, described, in 1883, by Schmidzmülheim, which is about $\frac{1}{25000}$ of an inch in diameter, with motile power, and partly arranged in chains. Duclaux has discovered two species of cap-

sulated bacteria, which he called *Actinolacter* and *Actinolacter polymorphus*. Loeffler's "*Bacillus lactis pituulosi*" and Adametz's "*Bacillus lactis viscosus*" belong to this class. The latter is $\frac{20}{1000}$ to $\frac{14}{1000}$ of an inch long and about $\frac{20}{1000}$ of an inch broad, and was first isolated from brooks near Vienna, polluted with the wastes of several factories. Van Laer has described two bacilli first found in stringy butter, which, when inoculated into sterile milk, also render it viscid, and designates them as *Bacillus viscosus I* and *II*; the former produces, first, a slimy yellowish-green curd on the surface, which is later dissolved, when the milk assumes a greenish tint. Guillebeau, of Berne, isolated an organism, which he called *Micrococcus Freudenreichii*, and which is very common in some of the Swiss dairies; it is about $\frac{12}{1000}$ of an inch in diameter, non-motile, and liquefies gelatine; it grows best at a temperature of 68° Fahr., and the milk can be drawn into slender threads $1\frac{1}{2}$ to 3 feet long; exposure for two minutes in boiling water kills this germ. Schütz's micrococcus and Guillebeau's bacillus, and the *Bacterium Hessii*, as well as a number of the potato bacilli, are believed to have the power of making milk slimy or stringy.

Abnormal Forms of Fermentation. In addition to the well-marked classes of fermentation already noticed, there are many, of which very little is known beyond the fact of their existence, and we will have to wait for further information until the complex processes of fermentation and decomposition are fully known. There are doubtless a large number of saprophytic germs, which only occasionally find their way into milk, and as it furnishes proper food for these accidental guests, they may grow in it to almost any extent, with the production of poisonous substances, of which tyrotoxin is a typical example. It is altogether probable that the germs which produce this poison will be isolated and described before many years.

Quite a number of bacteria have been described, on account of their harmful relation upon the manufacture of cheese; they appear to split up lactic sugar with such energy that they produce a large volume of gases, which causes the cheese to "heave," and are responsible for the production of abnormally large holes, most frequently seen in Swiss cheese. Von Freudenreich has isolated a bacillus which he named after Dr. Schaffer, and has been able to inoculate milk and produce cavernous cheeses at will; this bacillus is somewhat widespread, and he also found it upon potatoes, and thinks it is better to use lard instead of potato broth for smearing the hands before milking. He also believes this bacillus to be related to the *Bacterium coli commune*, a fecal bacillus, and advises great care, lest the milk should be contaminated, during milking, with cow-dung.

A matter of extreme importance to the sanitarian, as well as to the cheese-maker, is the fact that the milk of animals suffering with garget, or other inflammatory affections of the udder, contains a number of species of bacteria, all capable of producing gases, and, therefore, well-marked cavernous cheese. This subject has already been referred to, and suggests the possibility of an untold amount of suffering from the consumption of such milk.

There are also bacteria which, in their activity, evolve some of the foul-smelling gases, such as hydrogen, and if present in sufficient quantity will also cause the cheese to "heave." Weigmann has described

two organisms, and one of Duclaux's slime-producing bacilli belongs to this class.

Alcoholic Fermentation of Milk has already been referred to, and the preparation of koumiss and kefir has been explained, and it will be readily understood that alcoholic milk fermentation is the result of bacterial action, either with or without the presence of certain milk yeasts. Duclaux, Grotenfelt, Kayser, Weigmann, and others have described various yeasts; some curdle the milk and produce only small quantities of alcohol, while others produce more of alcohol and very little lactic acid. We have referred to red yeast under chromogenic germs.

Butyric Acid Fermentation. In speaking of casein ferments, attention has been called to the fact that they curdle milk without the presence of an acid. It is highly probable that this action is brought about by the effects of alkaline bacteria, and that certain species of bacteria give rise almost simultaneously to two distinct forms of fermentation in milk; one producing a rennet-like curdling, and the other a digestion or dissolving of the casein. Pepton is readily demonstrated at this stage of fermentation, and not infrequently also leucin, tyrosin, ammonia, and butyric acid, and because of the presence of this acid this form of fermentation has been called butyric acid fermentation.

Pasteur first pointed out the fact that after sterilization of milk, the curdling took place under an alkaline instead of an acid reaction, and that the lactic acid bacilli were entirely absent, but instead, a number of other organisms were found, which have been constituted into a special group, called the "butyric bacteria." Such a division, according to Freudenreich, seems scarcely justifiable, because "butyric fermentation is not a uniform process. Butyric acid is rather to be regarded as a residue, resulting from the breaking down of casein and milk-sugar in various ways; it is only, in fact, like leucin, tyrosin, and ammonia, the final product of diverse kinds of fermentation." Scholl¹ describes the following organisms under the head of butyric acid fermentation, viz.: *Bacillus butyricus* (Hueppe), *Bacillus mesentericus volgatus*, *Bacillus liodermos*, and *Bacillus lactis albus* (Loeffler).

It was at one time assumed that the *Bacillus butyricus* and other organisms of this class were the sole causes of rancid butter. While it is true that rancid butter contains considerable quantities of butyric acid, and the development of the rancidity is simultaneous with the appearance of this acid, it is now held that rancidity is simply hastened by these organisms, and may occur when they are entirely absent, and that rancidity is probably due to a direct chemical oxidation, closely connected with the agency of sunlight. This group of *casein ferments* plays, however, an important part in the ripening of cream and cheese.

Prevention of Harmful Dairy Bacteria, and their Effects. The rôle of obnoxious dairy germs has been briefly sketched, and as they are an injury to the dairyman, and as unwelcome as disease germs are to the public, something should be said of their prevention. Heretofore the farmer has not been willing to accept the microbial origin of these milk defects, and the fodder has received most of the blame. It is true that many of the saprophytic germs and ferments are found in brewery and distillery refuse, and are, therefore, liable to contaminate the air of the stable, and thus gain access to the milk. Other germs may cling to the hay and bedding, walls, floor, etc., but in all these cases the fodder only plays an indirect rôle, and we may take it for granted that unless the

cow is diseased, her milk, except perhaps the first strippings, is perfectly free from germs, and whatever germs are found thereafter have gained access from without. The microbes may reach the milk from the surface of the udder or skin of the animal, from the hands or clothing of the milker, from the utensils, from the water and rags with which they are cleansed, nay, even from the air of the stable, milk-house, or dairy, not to mention such extraordinary practices as watering the milk with polluted water, or lubricating the hands of milkers with their own saliva, or with potato-broth, before milking, or spitting upon woollen rags and polishing-powder while scouring dairy utensils.

To those dealing with milk in any form, the various fermentations are especially undesirable and a source of loss; they, like their customers, want the milk pure and sweet, and when they realize that even the common souring is due to the action of germs introduced from without, they will certainly endeavor to reduce their number to a minimum, and this is best accomplished by absolute cleanliness, prompt pasteurization, and keeping the milk afterwards at a temperature between 40° and 45° Fahr.

By scrupulous cleanliness in the barn and dairy the number of organisms which get into the milk may be at least kept down; and just as the surgeon makes a careful toilet before operating, in order to prevent wound-infection, so the dairyman should make a careful toilet to prevent milk-infection. For this purpose, also, the animals should be kept clean, the udders thoroughly washed, and the first strippings of the milk should be rejected. Having learned that milk, especially when still warm, affords a splendid culture medium for all sorts of germs, and as the natural process of cooling in summer is entirely too slow, it is evident that after previous pasteurization it should be rapidly cooled by immersion in cold water, or by placing it upon ice. A practical application of this knowledge means increased profits to the milk-dealer and health to the bottle-fed babies.

The prevention of *abnormal fermentations*, such as blue milk, red milk, slimy milk, etc., is somewhat more difficult, but it may be accomplished by care. If a dairy be troubled suddenly with any of these milk-defects, the first thing to do is to determine the cause and stop it; the remedy often enough consists simply in extra cleanliness. The microbes of a certain form of stringy milk may cling to the fodder, like the leaves of butterwort; other abnormal germs may be in the hay or bedding which the milker has handled, or they may be in the dust which has been stirred up in the milking-shed. Sometimes the trouble may be traced to one or more cows among a large herd; thus, the germs of red yeast were traced to five particular cow-stalls in one of the Swiss dairies, and after thorough disinfection the trouble came to a speedy end. In order to determine whether a stringy or abnormally colored milk comes from a particular cow, it is simply necessary to set aside samples of milk from the different animals in previously sterilized glass bottles, closed with cotton wool, properly labeled, and to examine them in the course of twelve to twenty-four hours. If the stringy milk be traced to a certain animal, a careful examination will reveal whether she is suffering from an inflamed udder, and if necessary, the aid of a veterinarian should be invoked. The animal may be free from inflammatory trouble, and still yield a stringy or slimy milk, in which case special care should be taken to wash the teats with a weak solution of acetic acid, for the purpose of removing any bacteria that may be present. If the milk drawn

with these precautions, directly into sterilized glasses, does not become stringy or only slightly so, we may conclude that the germs are present in the stable and gain access at the time of milking, and this can be readily proved by leaving uncovered glasses of milk in the stable. This procedure is also applicable to the determination of the source of the chromogenic germs. If the stable or dairy is found to be the source of infection, it should be thoroughly cleaned and disinfected. After turning out the animals, the dirt should be carefully removed; walls, floors, woodwork, and ceilings should be scrubbed, and then washed with *milk of lime*. The quicklime is dissolved in a little water, and then mixed with the same bulk of water. This method has proved very efficient for the disinfection of the premises. Sometimes, burning sulphur is used, in which case, after a thorough cleaning, all openings and crevices must be closed, and 1½ ozs. of sulphur for every cubic yard of air-space should be burned in an iron pan, while the premises are still saturated with moisture. In the meantime, the animals should be carefully cleansed and their feet washed with soda-water; the personnel of the dairy should take a bath in a disinfecting solution, and should change their clothing, which should also be disinfected by boiling or steaming. If these milk-infections have invaded a cheese factory or a creamery, which receives its milk from different sources, the mischief may be traced to a particular farm by setting aside samples in the manner already indicated. The most troublesome infections to the cheese-maker are the gas-producing bacteria, which cause the heaving of the cheese. To determine the source, Walter has proposed a very simple test, by exposing the various samples in fermentation tubes, to a uniform temperature of 98° Fahr. If the milk be good, it should remain for ten to twelve hours without curdling or abnormal fermentation. These tubes, of course, should first be sterilized, either with steam or with sulphuric acid, and rinsed with water which has just been boiled. If the "fermentation test" fails to trace the mischief to any particular milk, the fault may lie in a polluted water with which the utensils have been washed, or in the rennet used to coagulate the milk, and in order to determine the exact source, Walter's test is again tried. This time sterilized skim-milk is placed in the fermentation tube and a little suspected rennet is added to some samples, while others are inoculated with suspected water; some of the tubes are inoculated with one drop only, others with more. Evidence of fermentation points with suspicion to either the rennet or water, and the evil can of course be corrected by changing the rennet or by the use of boiled water. Sometimes a sample of milk curdles badly upon the addition of rennet, and this may be due to the chemical composition of the milk, rather than to bacterial action. In order to avoid a whole batch from being spoiled, Dr. Schaffer has devised a test, described by Von Freudenreich: "The milk is heated in a water-bath to 95° Fahr. and treated with a given quantity of rennet. It is then seen whether it curdles within the usual time. To 4 fluid ounces of milk is added $\frac{3}{4}$ of a drachm of a solution of rennet, prepared by dissolving one of Hansen's smallest rennet tablets in 18 fluid ounces of water. Sound milk ought to curdle in from ten to twenty minutes. If milk thus tested curdles badly or not at all, it should not be employed for cheese-making." If any of the abnormal fermentations are traced to the premises or utensils, a thorough cleansing and disinfection are indicated, and whenever steam is available this should be employed.

The addition of chemical substances, such as carbonate of soda, salicylic acid, borax, boracic acid, quicklime, and peroxide of hydrogen, with a view "of improving the keeping qualities of milk," cannot be tolerated from a sanitary point of view.

We earnestly recommend to the dairyman *absolute cleanliness* as the best safeguard to keep the germs out of the milk, speedy pasteurization and a *subsequent low temperature* for the purpose of inhibiting the development of the germs; and to the consumer we repeat the necessity of exposing the milk to a temperature of 170° Fahr., for the purpose of killing whatever disease germs may have gained access since it was pasteurized at the milk farm.

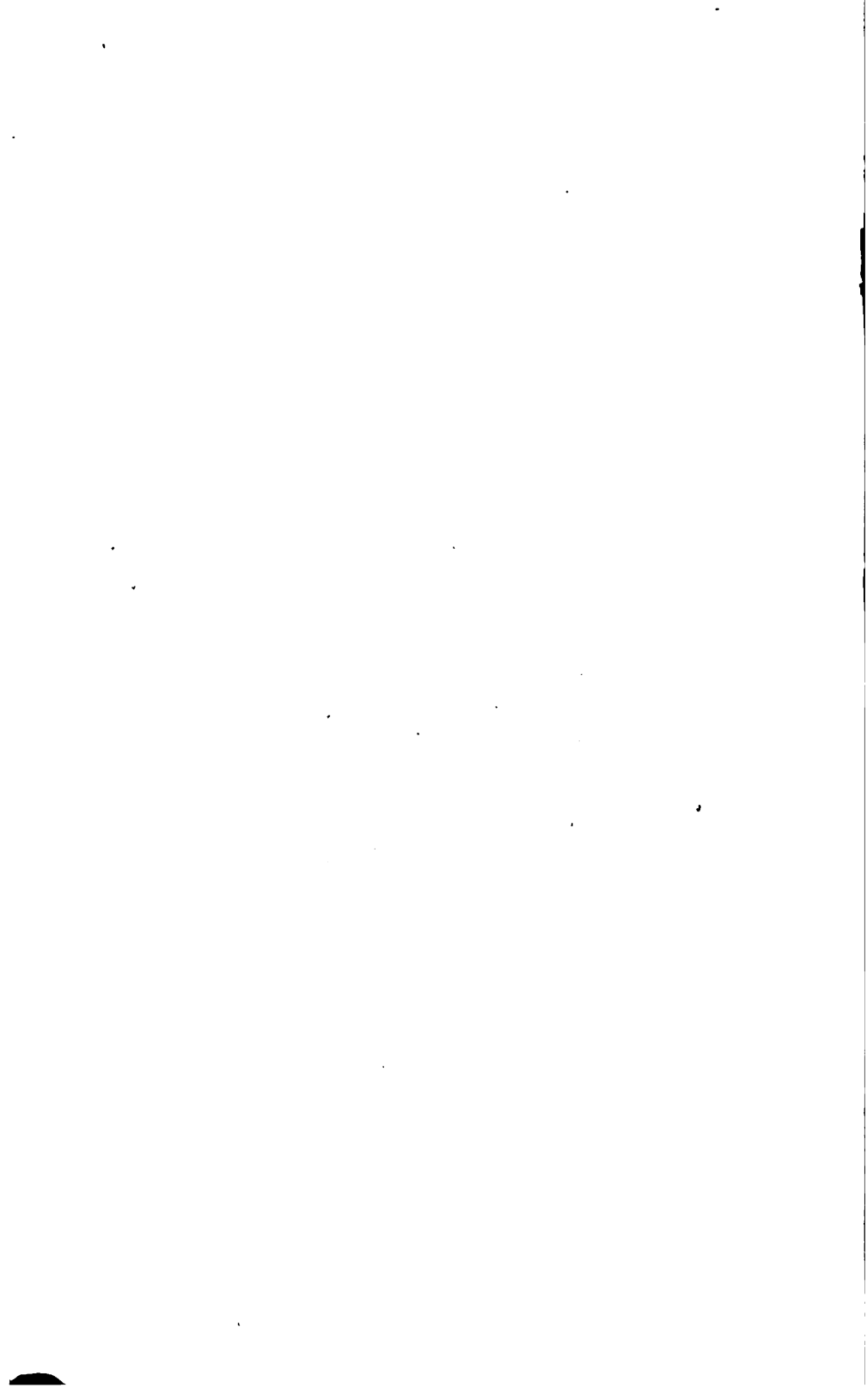
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FOURTH ANNUAL
STATE SANITARY CONVENTION,

HELD UNDER THE AUSPICES OF THE STATE
BOARD OF HEALTH,

AT LOS ANGELES, CALIFORNIA, APRIL 20, 1896.



FOURTH ANNUAL STATE SANITARY CONVENTION.

LOS ANGELES, April 20, 1896.

The convention was called to order by the President, Dr. C. W. Nutting.

REV. BURT ESTES HOWARD, of Los Angeles, delivered the following prayer:

"Our Father, we thank thee for the spirit of which this convention is an utterance; that spirit of earnest desire to make the world a better place for men and women to live in.

"We thank thee for the gospel of humanity; we thank thee for all these efforts being put forth to relieve the misery, and distress, and wrong, and pain of the world. We ask thy special blessing upon this gathering. Let there be here a keen insight, a depth of analysis and breadth of sympathy, and a nobility of purpose that shall be a stimulus to a larger and better work on the world itself.

"We ask in his name who was the Great Physician. . Amen."

ADDRESS OF WELCOME.

HON. FRANK RADER, Mayor of Los Angeles, who was to have delivered an address of welcome, being out of the city, Dr. J. H. DAVISSON was introduced, and spoke as follows:

"*Mr. President and Gentlemen:* You are no doubt disappointed, as I am, at not having the Mayor with us this morning. He has evidently learned that he is liable to be dethroned this week by Her Royal Majesty, the Queen of La Fiesta de Los Angeles, and he has probably taken time by the forelock and taken to the tall timber for safety.

"I am somewhat reminded of Eli Perkins and his many occupations and professions when I appear before you, embarrassed as I am, in the place of our Mayor. Eli said that he had many accomplishments and many occupations, and he had recently been sitting for pictures—sitting as a subject for landscapes and various kinds of pictures; but he said that the most difficult and the most nasty thing he had undertaken to do was to sit to represent a whole drove of cattle. It is so with me, in undertaking to represent the Mayor of Los Angeles. I have no aspirations to do so, and in fact I shall not. I shall not undertake to represent the Mayor of Los Angeles; but I don't want you to make a misapplication of this incident of Perkins, that I have alluded to, and think that I am here to represent a whole drove of cattle. I am here to represent the angels, as this is the City of the Angels, as you are aware.

"I hope that your stay among us may be pleasant, and that you may incur the favor of Her Majesty the Queen, and that you may escape

the insults of the rioters of Comus, if you know who that is (I do not), and that you will escape being killed by the trolley cars or being run over by an oil wagon.

"I shall not undertake to represent the Mayor or even the City Government, but I am here simply as an humble citizen of this southern metropolis, and it affords me much pleasure, as one of the humble citizens of Los Angeles, to welcome you here on this occasion, hoping that you may see much in our city and vicinity to admire, and that you may leave us with pleasant memories of Los Angeles. On the part of the California State Board of Health I also extend to you a cordial welcome.

"It is my pleasure, inasmuch as we have been disappointed by our Mayor, and as I have not the ability to address you on this occasion, to call on one whom I know to be a speaker: the Reverend Dr. Burt Estes Howard."

DR. HOWARD: I suppose that Dr. Davisson thinks I am perfectly qualified to represent a whole drove of cattle or a stock-yard. I certainly cannot fill the Mayor's shoes; he has great difficulty sometimes in filling his own shoes. Yet, to add just a word to the welcome which Dr. Davisson has extended to you, I would welcome you in the name of brothers in a grand work for humanity; for I believe with all my soul that your ministry—for it is a ministry—is no whit less noble, less divine, or less ordained, than my own. These are days of large thought. These are days in which our conceptions of religion are expanded. We are not satisfied now with that definition of religion which is content with an attempt to save the souls of men out of a wrecked and devastated world into a frivolous and useless Heaven in another world, but we are gaining slowly and surely the broader idea that the true religion is the religion that strives to make this world a fit place for men to live in; that seeks to drive pain and distress and misery and everything that hurts and bruises out of this life in order that men may dwell together in peace and harmony as brethren. Fix this life, and the next life will take care of itself. And so this practical gospel, this practical ministry, is the ministry in which all of us are engaged when we truly understand life's mission and life's scope. And therefore I welcome you, not simply in a perfunctory association as members of a board of some kind or another, but I welcome you with the cordial right hand of fellowship as standing with me and my brethren, in an earnest and human and present effort for the uplifting of the race. I welcome you in a practical and in a hearty way, and wish the blessing of God upon your efforts. [Applause.]

ADDRESS OF PRESIDENT DR. C. W. NUTTING, OF ETNA.

Members of the Sanitary Convention, and Visitors: A year ago, at the meeting of the Third Sanitary Convention in the State of California, I was called to preside over your deliberations. At that time I indicated that, as had been the custom theretofore, it would be my pleasure, at the time of my retiring from the office, to say a few words to you. This I decided to do, simply because those who had preceded me in that office had set such a precedent; not because I felt that I could say anything

which would add in any way to your knowledge of sanitary affairs or to your pleasure while in the meeting.

And now I only desire, in a general way, to indicate some of the features that we desire to work out by these gatherings of physicians for the purpose of studying preventive measures for diseases. That, in my opinion, is the great aim and object of all regular physicians. It is well enough, of course, to be able to mitigate, in some degree, pain and suffering incidental to sickness. It is more noble, it is more attractive, to be able to prevent sickness. All over this broad land of ours medical men have for a long time been engaged in the elucidation of the causes that lead to a great many diseases, and as they have been enabled to find out those causes, they have, to a greater or less extent, been enabled to prevent some of these diseases; and I believe the time is coming when we will so thoroughly understand all the circumstances, and all the surroundings of these contagious diseases particularly, that, while we may not be able to entirely eradicate them from the experience of human life, we will be able to mitigate them, and we will be able to reduce their ravages to a minimum.

It takes long years of thought, long years of careful study, to understand thoroughly the history of any disease. It has been a good many years since Jenner accidentally discovered the principle of vaccination for the prevention of smallpox; and in that direction, it seems to me, in the direction laid down by him—and that field to-day is being thoroughly cultivated—we may perhaps find in those diseases where one attack prevents a future attack, we may perhaps find the solution of the prevention of that kind of disease.

We understand, no man, perhaps, better than physicians, that it is by slow and halting steps that we arrive at scientific conclusions. Many times we will be led astray by false lights; but after awhile the sober second thought of the profession will place on a proper basis all of these remedies that are suggested for its consideration.

There is one thing, and particularly, it seems to me, in the last few years, that has made physicians perhaps more skeptical than they naturally would be when any new remedy—and this refers particularly to curative measures—is presented for their consideration. More than once within the last five or six years have we been misled by statements from men high in scientific authority, and we have become incredulous; but after all, these are simply some of those halting steps by which we will finally arrive at the truth. After these propositions had properly come before the profession and had been properly weighed in the balance and found wanting to a great extent, it simply instigated us to greater efforts in working out these problems; and the profession all over the world is to-day engaged in these problems of sanitary preventive measures, which will ultimately redound to the great good of the people.

It sometimes seems strange to the laity that physicians should desire to prevent disease. They cannot understand that as a business proposition. They think that every physician feels just as the man does who runs a store or any other kind of financial business: that it would be to the interest of the profession were there more diseases and sickness. But, speaking from an experience of twenty years of practice, and from my experience in my association with a great number of physicians, I say candidly that it is the desire of every physician to limit, in so far

as possible, the ravages of these diseases. I don't think it is necessary for me to prolong my address. I again thank this convention for the honor it conferred upon me one year ago, and desire to predict that great good will result from the gathering together of physicians in sanitary conference from year to year in this State. [Applause.]

[Dr. J. H. Davisson takes the chair.]

THE CHAIRMAN: The next thing on the program is a response by Dr. W. F. McNutt, of San Francisco. I don't believe the Doctor is in the room. I am not sure that he is in town. We will pass that for the present.

ELECTION OF OFFICERS.

Dr. W. F. Wiard, of Sacramento, placed in nomination for President for the ensuing year, Dr. J. H. Davisson, of Los Angeles, and he was elected unanimously.

C. C. Wadsworth, of San Francisco, was elected Secretary pro tem. unanimously, the Secretary being absent.

P. C. Remondino, of San Diego, nominated and elected Vice-President unanimously; Thomas Ross, of Sacramento, elected Secretary; C. C. Wadsworth, of San Francisco, elected Second Vice-President, unanimously.

Drs. J. R. Laine, Thomas Ross, and W. F. Wiard, all of Sacramento, were appointed a Committee on Publication, the President announcing that they were all chosen from Sacramento for geographical reasons.

[Adjourned until 1:30 P. M.]

AFTERNOON SESSION.

THE PRESIDENT: Permit me to extend my thanks to the convention for the honor conferred in selecting me to preside over your deliberations for the ensuing year. I cannot convince myself that you again want to hear me make a speech, as you heard me, or some of you did, this morning, and I will not take your time. I shall endeavor, with your coöperation, to discharge the duties of this office without default. We will proceed with the program.

STREET-CLEANING AND DISPOSAL OF GARBAGE.

By H. S. ORME, M.D., of Los Angeles, Cal.

The subject of street-cleaning and proper disposal of garbage, etc., cannot attract too much attention. Especially are these matters important and interesting to those of us who are so fortunate as to live in the large and growing cities and towns of California.

We are all proud of our State, its climate, productions, etc., but to make it more and more appreciated, not only by our own citizens, but also by those who, living in less favored regions, visit us, we must have

the reputation—together with that of the best climate in the world—of having the cleanest and the most healthful, the most economically and best governed cities and towns of any State in the Union.

Our streets should be put in good repair and kept clean. That they can be kept clean we have no reason to doubt, for the great interest taken in sanitary matters the last few years, not only by the members of our own profession, but also by the general public, shows that the people are willing to carry out the principles of sanitation if they can be shown the necessity. In this world many persons will only do certain things from necessity—when they are forced to by law, or when they see a threatened epidemic and death confronting them.

In the cities and towns of the civilized world it is agreed that some method of removal of refuse, garbage, and excreta is imperative in all cases, but the means adopted varies with local conditions and notions of economy and efficiency. Sewered cities make use of water carriage for all matters which can be dissolved or suspended, while those without such works have to treat all on the same plan. In this paper I propose to deal with such matters as can be hauled from streets and premises.

Some cities contiguous to the sea (New York, for example) collect street-sweepings and household refuse and dump them at turn of tide into the lower bay. Others, as New Orleans did formerly, transport all refuse, including night soil, in barges below the city and dump it into the river. Some, like San Francisco, send human excreta into the bay through sewers, and other refuse to the dumps. Still others, like St. Louis, Milwaukee, Detroit, Fort Wayne, Indianapolis, Savannah, and Atlanta, destroy such matters by fire, including, in some cases, night soil and the largest dead animals, within inhabited limits, and without creating a nuisance. All the plans, except the last, are attended with great offense to the senses, and, doubtless, in many instances, with detriment to the public health.

Various patterns and patents for crematories have been devised. Some, like the Merz Universal Extractor, or the American Incinerating Company, as at Philadelphia, are designed to save products of value (principally fats from kitchen refuse); but it is often found impracticable to avoid objectionable stench in these operations; besides, the apparatus is quite expensive, and the results in many cases would afford scarcely any profit. On the whole, the most satisfactory method is found in the simple and complete destruction by fire, without odor, of all combustible substances of this class.

The necessary expense of cremation is governed by several varying conditions:

1. The price of coal, which, unfortunately, is high in California, but probably crude petroleum can hereafter be substituted.

2. The kind of apparatus, for some furnaces require more fuel than others.

3. The nature of the matters to be consumed, night soil and large animals requiring most fuel.

4. Period of firing, the most effective plan being to keep up the fire day and night.

5. Length of haul.

In California it is especially important to economize the consumption of coal by the best apparatus and continuous firing, but crude oil can and will be used in Los Angeles. In order to avoid long hauling, a

sufficient number of furnaces should be provided in cities, so as to be reached by a haul not exceeding two miles in length.

There is too much diversity in the method of gathering the refuse. In San Francisco, householders pay private parties a stipulated amount monthly to haul away the stuff. In Los Angeles, private contract runs for three years, which should be five. In some other cities and towns, public carts do the work at the expense of the corporation. In a few cities, the health department does the whole work at public expense, and it is generally agreed that this last plan is by far the most satisfactory, and, perhaps, as cheap as any effective one.

The following is the plan adopted at Atlanta, Georgia, which gives complete satisfaction: Every householder pays a tax of \$3 per year. All kinds of refuse, including night soil, are burned, and this is done so perfectly that no stench is perceptible. A horse's carcass is completely consumed in one hour and ten minutes. The apparatus there used is the "Dixon Crematory," the same pattern as the one now being erected in Los Angeles; not, however, owned by the city, but by the contractors, who are having it built at a cost of about \$10,000. The amount of matter consumed at Atlanta in one year (June, 1894, to June, 1895) was as follows:

Garbage burned.....	14,048,500 lbs.
Night soil.....	7,627,500 lbs.
Dead animals.....	192,476 lbs.
Total.....	21,768,476 lbs.

or, 10,884½ tons.

This would give an average of a little less than thirty-five tons daily, excluding Sundays, consumed by three tons of soft coal or screenings, or nearly twelve tons of mixed refuse to the ton of coal. Three men (unskilled employés) sufficed to do the work.

In most cities and towns dead animals are gathered and disposed of, without charge to owners, by companies or individuals, who repay themselves by utilizing various products.

It will be observed that more than one third of the weight of matters consumed at Atlanta is night soil, and it is probable that more than half the cost is due to this wet substance, which would be otherwise disposed of in sewered cities.

A very large portion of town refuse consists of street-sweepings, consisting mainly of droppings of horses. With an effective plan of street-sweeping and a reasonable rate of transportation by rail or water, most of this matter ought to be used for fertilizing. A small part is now utilized by gardeners, who are willing to haul it for a short distance. It ought to be gathered, compressed, baled, and sent to the country, and will be in time; but, for the present, the best disposal for most of it is cremation. San Francisco and a number of other cities and towns in California still remain in the barbarism of dumps within the city limits, and near the dwellings of many poor people, and this custom must prevail until the political boss is retired from business. In Atlanta, the health department attends to all this work, and it is claimed that there is no politics in the business.

A few words are appropriate on the point of street-sweeping. Revolving brushes have been devised, which operate rapidly on smooth and unobstructed thoroughfares, but they never do thorough work; besides,

they can work only at night, when street traffic has almost or entirely ceased. These machines have been abandoned on the most important streets of San Francisco, and sweeping by hand through the day has been restored. No dirt piles are allowed to accumulate on these streets, and the metallic receptacles are emptied promptly into carts and the contents are hauled away to the dumps or given to any gardener who will take them. One or more crematories in San Francisco are now the one need to a satisfactory solution of the garbage problem.

In Oakland, the present system of disposing of the city's garbage is not satisfactory to the Board of Health or Health Officer. He informs me that the charge for removing one carload daily is \$122 50 per week, and then all is not taken out of the city. The crematory, so far, works satisfactorily, but a thorough test has never yet been made. It is a private plant, and no regular patent. The streets of Oakland, the Health Officer reports, are swept satisfactorily.

From the foregoing it will be seen that cremation is the proper method for disposal of garbage, and that our streets can and should be swept and kept clean.

Before closing this paper, for the information of many who are not familiar with the Dixon Garbage Crematory, I would state that there have been erected within the past three years, and in successful operation, seven Dixon Garbage Crematories in the United States. Several are under construction—one at Los Angeles, California, and I hope, soon, another at San Diego. A brief description of the Dixon Crematory is as follows:

The main part has a large furnace, about five feet deep and five feet wide (the whole length), into which garbage, night soil, dead animals, slops, etc., are emptied through large openings in the top, which, when opened, also receives a current of air, drawing into the furnace all stench from the garbage. The stuff falls on the grate-bars of the furnace, the fluids and finer garbage percolating through between the grate-bars into the lower furnace, or evaporating pan. Each of these has an independent fire, consuming all that comes in its way. The smoke, stench, and gases arising therefrom pass over the retaining walls and through an opening in the base of a fifty-foot stack, where the stench consumer is located. This is about three feet square, and is arranged with a "checker-work" of fine clay blocks, to be kept at a high heat by a small fire underneath, and by the extra or escaping heat from the other furnaces and burning gases, which entirely consumes all stench and gases coming from the process of cremation of the garbage, night soil, and dead animals—a regular "stench consumer." Also, on account of this arrangement, the temperature in the garbage furnaces can be kept quite low—say 600° to 800° Fahr.—thereby saving fuel and lengthening the life of the furnace. Some of the companies claim that they now use a fire in the stack, yet that will not prove a success with an open stack, and this idea of a checker-work or cross-sections in the base, to hold the heat and gases until consumed, is covered by the Dixon patents. You know that one can pass his hand through a flame of fire and not be burned, but when coming in contact with a very hot solid substance it must be burned.

Since the above was written, I am informed that several different plans have been tried at Philadelphia. The first was to dry and press the garbage into bricks, to be used as fuel. This proved a complete failure. Afterward they tried two different cremation furnaces, both of which

were unsatisfactory. I am not informed about the details of these furnaces nor the ground of dissatisfaction, but presume that they caused a stench. Finally, they tried the "Arnold System Improved." "The garbage is sterilized and pressed, producing grease and a dry fertilizer, for which there seems to be a ready market." No comparison between the value of the products and the cost of gathering and treating the refuse was given me. This plan is favorably spoken of by the Health Officer and by the Chief of Bureau of Street Cleaning.

In closing, I will call attention to a household garbage carbonizer or destroyer which has lately been devised in Massachusetts. In the joint of the pipe or elbow that makes the connection between the stove or range and the chimney flue is placed a horizontal cylinder or drum, somewhat larger than the stovepipe connections. One end of this cylinder is permanently closed, the other removable, and attached to the inside of this end is a basket or tray made of perforated iron, shorter and smaller than the cylinder itself. The area of space around this basket, when set in this cylinder, is larger than the area of the pipe from the stove or range, so that there can be no obstruction of the draught.

"When in use the basket is charged with the kitchen waste, returned to the cylinder into which the basket sets, by a locking device, and the heat from the fire passing around the scoop and through the perforations drives off the moisture in a short time, turning the contents into charcoal; this dried and charred waste is then put upon the fire and utilized as fuel." They are made of various sizes to suit the needs of families, and are said to create no stench. It is probable that this device may be found more economical and satisfactory, in many cities and towns, than any other disposal of kitchen refuse.

HON. ABBOT KINNEY, of Los Angeles, being called upon by the President to open the discussion, spoke as follows:

Mr. President, as a layman I hardly feel a right to open any remarks upon this interesting paper by Dr. Orme without expressing my appreciation, as one of the citizens of this republic, of the noble humanity and broad spirit of general utility and advantage to mankind that has been shown by the medical profession, in the study of medicine, to alleviate the sufferings of humanity. The medical men have, more than any others, gone into the prevention of disease, and have assisted in every municipality in this country, and, as far as I know, in other countries, in diminishing the amount of sickness and the causes of sickness, and I think that every layman should appreciate that and give it consideration, and I open my remarks with that statement of my feelings in the matter.

In this matter of city street-cleaning, Dr. Orme has touched upon one point, and merely touched upon it, and that is the abomination that we are subjected to by our unfortunate political methods. I have recently been reading the very valuable work of Mr. Albert Shaw, on Municipal Government on the continent of Europe. It is the second volume that he has published. The first one dealt with the municipal governments in Great Britain. I think that if there is anything that would make an American blush for his country and its institutions, it is the accounts that are given by Mr. Shaw of the methods which prevail in foreign cities. We find that our cities, as a rule, taking them as a class, are forty or fifty years behind the European cities in their sanitary methods.

I am really astonished to find the almost universal superiority of European cities, extending even from Budapest, in Hungary, clear through to the English cities, over our own. That is a condition of affairs which we ought to cure. I think that the medical men in this country, particularly some of those whom I have known in New York, have done a great deal in this line; and here we have Dr. Orme in Los Angeles, taking up the same subject.

Now, what can we do in that way? That is strictly a sanitary proposition. It is not merely sanitary methods, but it is actual, physical sanitary methods that are involved in this political system that we have here. We had, some twelve months ago, a citizens' committee appointed here to make a new charter. In investigating and going through that we found that Los Angeles was not worse governed than other American cities, but still indifferently governed. There was not that *esprit de corps*, that capacity shown in the specialties that ought to be found in every municipal government. As a result of those investigations, I suggest this to the gentlemen who are here, as the first practical step in reform; it is one that requires no new law. That is one of the great difficulties in almost all these methods that are proposed—that it requires a new law. This one does not. What I suggest, and what some of my friends have agreed to propose, is the working of all citizens for a civil service in all the minor or technical departments of the city. There is no law to prevent that, and no law is required or is absolutely necessary to insure it. We have here a public library that, some two or three years ago, was put upon the civil service plan—no tenure of office, but there was only one method for the rank and file to enter the library employment; that is to say, they pass a preliminary examination, upon which they become apprentices in this public library. Then they study for six months the library methods specially; at the end of that time they pass another examination, and if they pass that examination as specially fitted to manage a library, then they become eligible to office, and only in that way. In other words, no political service and no personal influence play any part. The result is that the library of this city has circulated more books per capita than any other library in this country. That shows that it is a just system, and all the public men who have been connected with it—and I have known quite a number of them—have expressed to me their satisfaction at the escape that that system gave them from the pressure of political and personal appointment. They were all satisfied, and glad to have it.

That brings up another point in this connection, as showing that it would not be so hard, perhaps, as it might be supposed, to get a civil service throughout the civil system; and that is this: that our system of political appointments really shortens the political life of the man who undertakes it. He can only appoint so many men, and for every one he appoints there are nine or ten who are disappointed, and he really thereby organizes a force that kills him at the next election. When you apply this to health matters—to street-cleaning and the inspection of foods—I think that any citizen of ordinary common sense would appreciate the great value, the great advantage, that would accrue to the city and to the service by having experts—men who, if they were not fitted for it at first, would be obliged to study as apprentices before they were appointed and salaried by the city. If you had a system of that kind for all your health inspectors and plumbing inspectors and others—that they had

to pass a technical examination in the particular line to which they aspired—you would gradually accumulate here a force of men who would understand thoroughly their business, and who would be fit to carry on these very delicate and important forms of municipal service.

The financial part of the health service in any community is immense. When you look through that book by Mr. Albert Shaw—and I certainly would recommend everybody who is interested in these matters to read that book—you will see what other cities have done. You take an epidemic, for instance, like that in Hamburg, of typhoid fever, and see what it cost that city and its business; how it drove the business and population away, and diminished the returns of the landlords and merchants and every one who had any business with the city. It is a thing of financial moment, even if we leave humanity out of consideration altogether; but when you take the next step, and look at the humanitarian aspect—the sick children and the sick people, and people who are disabled and prevented from doing their work and labor and become charges, more or less, upon the city—it gets a momentum which really makes the doctor and the sanitary congress the dominant feature of our interests in this country.

DR. C. A. RUGGLES, of Stockton: In the paper of Dr. Orme mention was made of the City of New Orleans, in regard to its garbage, as being transported in barges toward the ocean. I am not here to dispute that proposition, but I am here to say that from personal observation and full knowledge, derived from being on the spot, the City of New Orleans pays \$120,000 a year for the cremation of its garbage. New Orleans, as many know, is the dirtiest city in the United States, and is said to be the dirtiest in the world, except Constantinople. We all know from the formation of the City of New Orleans, that the subject of sewerage cannot be entertained at all; that is to say, in the same light that we look at it here. They have surface sewers. All the liquid portion of it that can be run off runs off in them. Their water-closets, the night soil, etc., as it is called, is kept and collected in hermetically sealed vaults, and is carried away by excavators whenever it is necessary. As I said before, New Orleans pays \$120,000 a year—\$10,000 a month—for the cremation of its garbage. It was my privilege, fourteen months ago, to be there, and I received, as one of the courtesies of the State Board of Health of Louisiana, the opportunity to examine that system of garbage cremation, and, unfortunate as they are, they certainly are trying to do the best thing they can. They have a series of tanks—in the first place, all the garbage is collected in wagons or carts; it is carried to a certain place, and then it is segregated, so to speak. The tin cans, and the bottles, and all those things, are taken apart and kept apart; then the others are put into a large tank, and then that is filled with naphtha, and after everything has been thoroughly soaked, so to speak, the naphtha uniting with all the oleaginous matter in that tank, a small degree of heat is applied to it, and the naphtha separates from the oleaginous matter; then next the burning process, and the dead dogs, horses, etc., all are burned into such shape that you could mash them together into a fine powder. The object of that, of course, is to separate the oil from the other substances, and that is saved and made, I presume, into cosmetics, or something else—soap, etc.—and all the rest is made into fertilizers and sold, so that the oily substance and the fertilizers almost pay the expenses of running the concern. But we must agree

with Dr. Orme in regard to one thing, and that is the necessity of the consumption by fire. There is no doubt about that.

DR. ORME: If the Doctor will allow me to interrupt him, I only stated that when I passed through New Orleans that was the custom. If I had received an answer to my letter I would have known that they cremated it. In some cities they do that. It is a wrong custom.

DR. RUGGLES: There is no doubt in regard to that point, and the only question is how it can be done the cheaper. They believe there that that is the best. I don't know whether it is or not. But I do know that a tax of \$120,000 put on to any city for garbage is tremendous to think about, and that the only point that I wish to emphasize, is the burning up of these things.

DR. ORME: I am very glad that Dr. Ruggles has informed me on that point. I only cited the different methods of disposing of garbage. When I went through New Orleans a good many years ago it was dumped; and in a great many other towns on the Mississippi River. If Dr. Ruggles read the transactions of the American Public Health Association, he will remember there was a paper there on "The Mississippi River, the Great Sewer," showing the probable effect of millions of tons of garbage that is thrown into the Mississippi River; that it is just a great sewer for all the towns on the river and its tributaries, the Ohio and others. It is a wrong system to put our garbage or sewage of any kind into our running streams, or even into our bays or ocean, as they did in San Diego formerly. I will make that correction in my paper. It seems that they have a crematory in New Orleans. It seems that they have an incineration or reduction process, the same as the process practiced in Philadelphia. In the proceedings of the Association it was said that the perfect crematory is yet to be invented. We hope that we have succeeded in getting one of the best in the United States, in the Dixon, here in Los Angeles. The garbage must be cremated.

YARD SANITATION.

By ALFRED E. REGENSBURGER, M.D., of San Francisco, Cal.*

Within late years there has been no end of essays on school, car, street, and every other kind of sanitation at every Sanitary Convention, but very little or nothing on yard hygiene. Why the yard has been treated in such a step-motherly fashion, and so ignored by sanitarians, is not in evidence. Yards were certainly intended for some use, and, being used, it goes without saying that their sanitation can not and should not be overlooked; and it is for the purpose of making some amends for the hereinbefore-mentioned shortcoming that this very short paper has been prepared, to which your kind attention is here directed.

We are careful, from an hygienic standpoint, as regards churches, schools, factories, cars, and boats, which are tenanted for a small part of every twenty-four hours, and other places serving only for a temporary and even for an occasional sojourn. Indeed, we do not stop here, but enact regulations, rules, laws, and ordinances concerning carts, vehicles, etc.,

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destined for the reception and transportation of garbage and other matters of an unhealthy and offensive character, so as to minimize and to rob them of any attaching danger, not to speak of the hygiene of dwellings. Then why not consider the yard? Is it an unnecessary or useless appendage or addition to a house? One would almost think so when one sees how it is done away with in many, if not in most, instances, in the more densely populated quarters of our larger cities.

Property is too dear in such localities, according to the owners' views, to waste on yards. Unfortunate, that sordid and mercenary motives should control a large part of the human race! The yard is the breathing-place, as it were, for the occupants tenanting the rooms fronting on it. A house without a yard is like a one-lunged individual. It can exist, and that is about all; or, more properly speaking, it should not be permitted to be.

Air and sunlight are great elements in convalescence. During the war of the Rebellion it was noticed that patients who were on the sunny side of hospitals made more rapid convalescence and were more times saved than those on the shady side. There is no room for doubt but that phthisis and other diseases are propagated and made worse by poor ventilation and vitiated air. No house can be properly ventilated and have the necessary amount of sunlight if it have not a rear yard.

Dr. Barry and Mr. Gordon Smith, in their report to the local-government board, demonstrated how, unmistakably, diarrhoea, phthisis, other lung and adynamic diseases prevail in back-to-back houses. This goes to prove that every dwelling should have a yard. Such at least is the prevailing opinion in most of the older and more settled countries. In England the government board makes provision in its by-laws that in every new building a space of one hundred and fifty superficial feet in the rear of dwellings must be kept free from any structure above ground, save closets and ash-bins. It is also prescribed that this space should extend the length of the building, and at no place must it be less than ten feet to the opposite structure. It is further ordained that, if the building be fifteen feet high, the minimum distance from one structure to the other must be not less than fifteen feet; if twenty-five feet high, not less than twenty feet, and if thirty-five feet and over, then not less than twenty-five feet.

The object of having a yard is to admit light and air to the rear part of the house, to aid in ventilating and in keeping in a salubrious and healthy condition the whole building, as well as to provide a playground for children, where they may inhale the fresh air and play and romp without being subjected to the dangers and evil influences of the street. Its atmosphere should be as pure and fresh as possible. It should have well-paved or cement walks, or be entirely covered by appropriate pavement; or, if there be room, and the owner's inclination be in that direction, it may be ornamented with flower-beds and shrubbery, lending a charm to the place. Its drainage should be as perfectly good as possible, so that no pools of stagnant water can collect or remain. It should, under no circumstances, be used as a dumping-ground for ashes, dirt, or refuse of any kind. Provision should be made for a properly constructed ash receptacle, and also for a separate swill-pail. The ash-pail should be constructed of metal—galvanized metal preferably—and have a cover of the same material, and so fashioned that the floor of the ash-pail does not reach to within a few inches above the ground, by its walls

extending that distance beyond its own flooring, so as to minimize the danger from fire if it happen to stand on a wooden pavement. It should be kept covered and be separate from the swill receptacle. The swill-pail should always be covered, and should be emptied and cleaned once in every twenty-four hours.

In cities, old-fashioned privy vaults should not be tolerated in yards, but water-closets of modern improved sanitary construction should be substituted for them. If a privy does exist it should not be nearer than six feet to a dwelling, and removed at least forty feet from a well. It is inconceivable that the old-style privies should be used in a modern city, but what can we say when a municipality like San Francisco has these abominations in some of its school-yards, as was the case at one of its schools recently closed for sanitary reasons by the Board of Health, where these death-dealing apologies for water-closets not only existed, but actually had no connection with the sewer, thereby endangering the health and lives of pupils and teachers, as well as being a menace to the entire surrounding houses, if situated in anything like close proximity to them? Not only should this school have been closed up, but also every school, or other private or public building, should be condemned unless supplied with proper water-closets.

Nearly every large city has ordinances on its statute books prohibiting or regulating the keeping of swine, cows, pigs, *et id omne genus*, within its limits. Those more advanced in sanitary affairs also have legal enactments precluding the turning of yards into poultry-houses. In the better residence districts the ordinances relating to the keeping of domestic animals are usually heeded, but when it comes to fowl they are more often honored in the breach than in the observance. We frequently find the yards turned from their legitimate uses and usurped as a stamping-ground by geese, ducks, chickens, and other members of the feathery tribe, kept solely for the edification of their owners, to the detriment of health, rest, peace, quiet, and comfort of the entire neighborhood. These yards and their inclosed poultry-pens are rarely kept as clean as they should and ought to be. No matter how clean they are kept, no matter what care is taken of them, emanations always arise from the bodies of these birds, from their decaying food and excreta, and if the yards wherein they are kept are small—as they are likely to be in nine out of ten cases in the residence portions of large cities—the place becomes foul in a double sense of the word. Malodorous evaporations loaded with disease-breeding germs coming from these coops or henneries find their way into the adjacent habitations, and are more frequently the cause of disease and death than is suspected.

It may be regarded as axiomatic that effluvia from decaying animal and vegetable matters and the germ-laden atmosphere from the emanations of animals generate and propagate disease.

Some medical gentlemen believe that to the close proximity of poultry to human habitations diphtheria can often be ascribed. An effort was made several years ago in San Francisco to draught an ordinance making it a misdemeanor to keep poultry within the city limits, for that very reason. Aside from the unsanitary condition which their presence induces and keeps up, the noises which they make during the night-time are of a good deal of moment to those who are light sleepers, and to the sick and convalescent such noises frequently retard convalescence. Were any one to erect a factory running at night, or any rest-disturbing

machinery, in the residence part, which would occasion but one half the noise, the whole locality would be up in arms, and it would not be tolerated. Why these animals should have special rights to destroy the health and sleep of the denizens of whole neighborhoods is incomprehensible. Large cities nearly always enact and enforce laws regarding the maintenance of domestic animals within the city limits. Why should they not against this nuisance?

This evil has grown to such dimensions in San Francisco that it will require herculean efforts to strangle the hydra-headed monster. We should and must have clean yards, that if an epidemic ever strikes our shores and infests our fair State, we shall be in a position to meet and vanquish it. With dirty, poultry-infested, and unsanitary yards, we cannot hope to throttle it with any too great a degree of success.

DR. D. B. VAN SLYCK, of Pasadena: Mr. President and members of the Sanitary Convention, I don't think the paper requires any extended notice. The value of it is self-evident. The importance of air and sunlight in our houses, especially attention to the rear yards of houses, is a matter of a good deal of importance. In large cities, where tenements are built back to back without yards, it is well known that disease prevails to a much greater extent than in those cities where the houses are not so close together. In most of the large cities laws are being formulated and attempts are being made to prevent the building of any tenement houses of this sort. I approve fully everything set forth in the paper, and give it my entire commendation. Of course, in some of our smaller cities it is not a matter of so much importance, although it is always important that there be an abundance of room in the rear of the house, and that the yards should be kept clean. The health of every community depends, to a considerable extent, upon that, and I am very glad that a paper of this sort has been presented to our notice, to call our attention to it, because even in the smaller towns the back yards of houses are very greatly neglected, and they are often in an exceedingly unsanitary condition, and are a menace to the health of the neighborhood. I think that subject should be brought to the attention of the health officers, and back yards inspected as well as other portions of the town that seem to call for inspection.

DR. H. S. ORME, of Los Angeles: I indorse everything Dr. Van Slyck has said; and there is one point Dr. Regensburger mentioned in his paper, and that is the keeping of diseased chickens and fowl of any kind in the yards. As the Doctor says, the yards around houses should be just as clean as the front door-steps, or cleaner.

DR. P. C. REMONDINO, of San Diego: There is one point that I would like to call the attention of the convention to in regard to these matters, and that is that there should be a law to compel each community to appoint what is called a public scavenger, whose duty it should be to conduct away whatever fetid matter there is about any premises, when called upon to do so by any citizen. At San Diego the scavengering is done by a private company, and it only removes the material as often as it is paid for doing it. The result is that a poor family, who is unable—for instance, here is a poor family, and the husband is earning very little; it is impossible for him to pay the fees that are asked by this private scavenger, and the result is that he allows the filthy material to accumulate in his back yard and about his premises until

it is positively offensive to the whole neighborhood; and yet, at the same time, when a man is poor you cannot compel him to do it. There is no public scavenger to attend to it, and the private scavenger will not remove it unless he is paid; and the only way to remedy that is to compel each community to have a public scavenger. Our City Board of Health saw the evil that resulted from the private scavenger business, and we undertook to have the city employ scavengers, and have them clean up things periodically, or whenever called upon; but the private scavenger association moved in a body upon the City Council, and they defeated us, and the result is that now there are dead cats and everything else lying around some premises. This subject of Dr. Regensburger is a very important one, and one that should be attended to by the local Boards of Health.

DR. REGENSBURGER: Mr. President and Gentlemen, I don't know that I have much to say in the way of closing the discussion, because other gentlemen who have spoken seem to agree with the views that I have presented in my paper. I think there can be only two views concerning it. We all need clean yards, and the yards ought to be kept as clean as any other part of the dwelling. As regards keeping poultry in the rear yards, I think that ought to be prohibited, and it is a very important point. That poultry have caused diphtheria a great many medical men believe. What I had in mind, when I spoke of a law being draughted to cover that case, is that several years ago, in San Francisco, Dr. Keeney, who was then Health Officer, made an effort to have such a law enacted and put upon our statute books, but somehow or other it fell through and never was enacted. In the larger European cities, and in fact even in the smaller ones, the keeping of poultry in yards is forbidden by law; and if it is forbidden by law there, I think it should justly be forbidden by law in this country. The lives of people in our American cities are worth just as much as those in other cities. It is certainly an ill, and one which ought to be remedied, and I am glad to see that the gentlemen who have spoken are in accord with me. I thank you, gentlemen, for your attention.

THE SPORADIC DEVELOPMENT OF SMALLPOX.

THE PRESIDENT: In regard to the title of this paper, I would say that this was suggested to Dr. Goodfellow, the Territorial Health Officer of Arizona, with whom our State Board of Health has had a great deal to do in the last few years, owing to the fact of the spread of smallpox from Mexico into Arizona. As many of you know, there has been smallpox continually in Arizona for the last year, and it has been quite troublesome. It has been off in little isolated cañons; a case would develop here and a case there, and there has been constant supervision over it, and Dr. Goodfellow has rendered good service, not only to the Territory of Arizona, but also to California, by his energetic coöperation with us; and in conversation with him he suggested such a title for a paper to be read at this convention.

In the printing of this paper an error crept in which was not noticed. It should be "sporadic" instead of "spasmodic," as it is printed in the program. The title of it would suggest opposition to the usually

accepted views in regard to the contagiousness of smallpox, but that is not contemplated. Unfortunately, the Doctor is not here, neither is his paper. In view of the error in the printing, it is due from me to him to explain the error in the printing. We will pass this paper, and perhaps we will receive it later.

TYPHOID FEVER FROM A FINANCIAL STANDPOINT.

By THOMAS ROSS, M.D., of Sacramento, Cal.

It is truly said that the work of the sanitarian contributes largely to the welfare of mankind, to the health, the vigor, and the pecuniary advancement of individuals; that his work, on account of its being done gratuitously, is too often unappreciated by the people, who pay little or no attention to his instructions, even in the presence of epidemics.

Until a comparatively recent date, every epidemic, including those of typhoid fever—a disease from which we may gain immunity by the adoption and enforcement of proper sanitary measures—was considered to be a manifestation of Divine anger. Prayers and earnest supplications were publicly offered to the Almighty, imploring him to stay the pestilence, the presence of which was directly due to the people's ignorance of sanitary laws; to their filthiness, or, in more recent times, perhaps, to their parsimony. This superstition was strongest where medical or sanitary knowledge was most backward, and where disease most prevailed.

As wealth depends in great measure upon the energy and the regularity in which labor is conducted, and on the returns made to labor, it necessarily follows that its accumulation is difficult in communities whose sanitary condition is bad, exposing them to the dangers of a low vitality and enfeebled constitutions, which render them an easy prey to the encroachments of disease. Where health is precarious and disease prevalent, poverty abounds.

A community in the full enjoyment of health possesses the principal factor for the production of wealth, and emphasizes the truism that public health is public wealth.

That typhoid fever is a preventable disease; that it is caused by a specific germ, the bacillus of Eberth, and that the bacilli gain admission into the human body by drinking infected water, are now well demonstrated facts; therefore, it is of the greatest importance that all potable water be pure, and free from decomposing animal or vegetable substances, and from any contamination whatever. In fact, the use of contaminated water is of such serious concern to the individual, attacking his life, his health, and his purse, that he cannot afford to take the chances of sacrificing either, by the use of such water. Knowing the dangers to which he is exposed, he should exert his whole energy to see that he uses only pure water for drinking and domestic purposes.

Where the water-supply of a city is pure, there is seldom or never seen a case of typhoid fever that is not imported from some other less favored locality. It is truthfully stated, that the number of cases of this disease in a community is a true index to the sanitary condition of the locality.

As the mortality of typhoid fever differs in different epidemics, it is difficult to give statistics which are universally applicable. There is no

doubt whatever that the mortality has, in recent years, been greatly diminished, in consequence of the treatment now generally adopted, so that it may be as low as five or six per cent.

In Sacramento, with an estimated population of 30,000, the fatalities from typhoid fever for the year ending March 1, 1896, were six in number—a record that any city of equal population would have reason to be proud of. This low mortality is undoubtedly due to the fortunate circumstance that the source of the city's water-supply—the Sacramento River—was not infected, during the past year, by the germs of the disease. If, however, the water of the Sacramento River should become contaminated by the germs of the disease from the Folsom Prison, or from any of the towns situated above Sacramento City that discharge their sewage into the river, the presence of an epidemic of typhoid fever in Sacramento, the fatality of which cannot be foretold, is inevitable.

One hundred and twenty cases of typhoid fever have been reported to me by the individual physicians of the city, as having been treated by them within the city limits during the year ending March 1, 1896, which represents a mortality of five per cent.

We will not assume, however, that the rate of mortality that occurred in Sacramento during the past year represents the average death-rate from typhoid fever in this nation, but we will base our calculations on the usual average mortality of fifteen per cent.

I will endeavor to present for your consideration a computation showing the amount of money expended annually for the care and treatment of persons afflicted with this disease.

It is stated that in the United States, typhoid fever carries to an untimely grave fifty thousand people annually. Assuming this to be correct, and estimating the population of the United States to be 65,000,000, and reckoning the mortality to be fifteen per cent—which will readily be conceded to be a fair average mortality from this disease—we have six and two thirds cases for each death, and six and two thirds times fifty thousand gives us three hundred and thirty-three thousand three hundred and thirty-three, the number of persons in the United States who yearly contract typhoid fever, a preventable disease.

The cost of medical attendance, nursing, medicines, and loss of time may be computed as follows—the average duration of the disease, including convalescence, being estimated at eight weeks:

Loss of time in each case	\$100 00
For medical attendance in each case	175 00
For nursing in each case	100 00
For medicine, etc.	75 00
Average total cost.....	\$450 00

Recognizing the fact that many persons who contract this disease are unable to defray the necessary expenses of their sickness, and are treated in eleemosynary institutions, or are cared for by relatives or friends, we will make a liberal allowance for them, and estimate the average total cost for each individual sick of typhoid fever to be \$100, instead of \$450, which amounts to over \$33,333,000, the sum expended annually by the citizens of this nation for the care and treatment of those afflicted with a preventable disease.

The contemplation of the vital importance, and of the grand sanitary measures that could be perfected by the yearly expenditure of this

enormous sum of money for *protection* from this one preventable disease, instead of for *its cure*, affords an enticing field for deliberation, on which we have not time to enter.

DR. C. W. NUTTING, of Etna: Mr. President, and Gentlemen of the Convention, I have never taken the pains to investigate, from a financial standpoint, the immense cost, as stated in Dr. Ross's paper, that arises from three or four hundred thousand cases of typhoid fever. As I suggested this morning, in my address, it is for the purpose of preventing just such a waste of the energies of the people, and just such a waste of time, that these conventions meet all over the country to consider the subject of preventive medicine. No one would doubt, for an instant, that Dr. Ross has not exaggerated in his statement of the figures, and I believe that such papers as his will be more apt to appeal to the laity than other more pretentious papers, that simply deal scientifically with these subjects. The American is, like almost any other person in the world, natural, and if you want to stir him up to the depths and get away down into his feelings, you want to touch the nerve that runs to his pocket-book; and if you can demonstrate to him positively that it costs a whole lot less to put in motion these sanitary measures than it does to be sick, possibly we will succeed in bringing out the necessary coin to put them into effect. I indorse Dr. Ross's paper, and think that his method of presenting the subject is one that will have much more effect, perhaps, than papers that deal simply with measures from a scientific standpoint.

DR. J. MILTON WELCH, of Los Angeles: I did not come to say anything. I am a stranger in this country, having been here about two years; but having had some interest in sanitary measures, I thought that I would like to come down and see what kind of a meeting you had here. I am pleased to see a few of the people of California at this convention. There is one thought, which occurred to me during the reading of the paper, that it was remarkable that five per cent was the amount of cures of typhoid fever performed in Sacramento. In Kansas, where I came from, there was an old gentleman who had never made a special study of medicine, who had gone into the southern part of the State in an early day, and had concluded that he would get a good practice, and he took this plan to do it: Every case he saw in that country was typhoid fever, and in six or seven days he would have the patients up. He happened to be a pretty good doctor in that respect, from the simple fact that it is not much to hurt anybody—give them a little tea, or something of that kind—but he got all of his typhoid cases up in about six or seven days. The result was, that he was the doctor in that country, because anybody who could cure typhoid fever before other doctors could tell whether it was typhoid fever or not, hardly—sometimes it would be difficult, before six or seven days, to determine exactly whether it was typhoid fever or not; but he would have them up, and it was typhoid fever. The question occurred, in my mind, whether there might not have been in Sacramento some incorrect diagnosis of the number of cases they had in the city, and, consequently, if it were so it might result in bringing the percentage down. I think it was a remarkable percentage. But if you will allow me to say one thing about the impression I have as to the gathering you have. You have a nice gathering—three or four ladies and a dozen or two gentle-

men in a city of one hundred thousand! I was somewhat acquainted with sanitary matters in Kansas. I was a member of the State Board of Health eight years; and we had sanitary conventions, and at each convention, in the several years during which I was a member, I think we never had a convention that we could not or did not fill a room very nearly full. People seemed to take an interest. Now, what I expected when I came down this morning, was to see this house full. In a city like this, it seemed to me, that the people ought to take enough interest in sanitary matters, especially where they are getting in sewers and fixing the city up, as a recommendation for others to come in it, that they ought to take some more interest than just a few. It would discourage me, if I were a member of the State Board of Health of this State, to see only a few persons present. It seems to me, that if we were to have a convention here to discuss horses, fine blood, fine stock, fine chickens, or anything of that kind, we would have this house full. But it seems to me to be strange that this house is not filled when it comes to sanitary matters, and especially when we have our children and our friends. Is it that California is banking on the climate? It seems to me so. Where the flowers rise like an exhalation in this climate, and people are reposing in the belief that they have no need to give attention to sanitary matters—this is the very place where sanitary measures ought to interest everybody, and ought to bring everybody out to a convention of this kind. Support the State Board of Health. Support it in all lawful and just means of promoting health matters in the State. In Kansas, we used to get the Governor, and we used to get the Supreme Court Judges and others interested in our affairs. We got them there. We had them make speeches or read papers, and prominent men all over the State, wherever we had a convention, we got them there, and we brought a crowd, and the people supported the State Board of Health in Kansas. So we had, after a year or two, one of the finest interests taken in the State Board of Health and sanitary matters that I have heard of in any State. I don't wish to be understood as criticising, because I could not criticise a crowd or a number of ladies and gentlemen who come out to a sanitary convention, but I cannot help noticing the want of interest in this State in these matters.

DR. J. R. LAINE, of Sacramento: I will say, with reference to the criticism that has been made of the few who turn out to conventions, that these proceedings are printed at the expense of the State, and the well-digested papers that are presented before a body of this kind, simply receive the indorsement of the convention at the time, and are then printed and distributed to the medical profession, and to the press throughout the State. In that way they reach a large number. In one evening a man may go through the transactions of a meeting of this kind that has lasted through an entire day, perhaps, under some inconveniences, by sitting with his cigar in his mouth or his feet before a grate, and he assents to or dissents from the discussions and sentiments that have been expressed. There is very little good done in this world by ephemeral exuberance of, you may say, rhetoric, or the results of oratory. We calmly act upon anything that we do in a sanitary way in deliberative bodies. So far as the State Board is concerned, it has very generally received all the support that it has deserved. Its actions have been characterized, so far as I know, by great deliberation. Everything has been very well weighed before any official action has been

taken. It has not been compelled, to my knowledge, to reverse its decisions or its action. This is an extraordinary occasion. Though I am not a resident of Los Angeles, yet I see very plainly that a great many people are attracted by the festivities that are in contemplation and in process at the present time. So far as I am personally concerned, I do not regard it as any slight to the State Board of Health, or to any medical gentlemen present, that there is not a larger attendance. The transactions will be printed, and will have a wide distribution, and I can assure you that, so far as I have been able to make comparisons, the papers that have been presented to the sanitary conventions heretofore compare favorably with those of any other State in the Union, and are complimented very highly, and have been sent for, and are being sent for many years after their publication. There is not a month that we do not mail perhaps forty or fifty, and sometimes two hundred copies, and we frequently have to say that we have no more copies, that they are out of print. That is the way it goes, and that is the way that good is done. Our State sends to other States for publications, and we digest matters and let it do as much good as it can.

DR. WELCH: I am not practicing now. I simply came here for my health. I did not mean any criticism at all; I did not think of it. The only thing that occurred to me was the want of interest in the matters. It is true that these publications are sent out through the country, and that in a measure modifies the remarks that I made.

HON. ABBOT KINNEY, of Los Angeles: I would like to correct the Doctor in one respect. When he said he was from Los Angeles, I felt it absolutely necessary for me to say something in regard to one of his statements. He made the statement that he was a stranger in this community, and that he had resided here for two years. That is a complete mistake. We don't recognize any statement of that sort.

DR. WELCH: The gentleman has not come from Kansas.

THE PRESIDENT: I would take the liberty of saying that I don't think Dr. Welch's statements were misunderstood. We don't take it that they gave any offense. Personally, I think they are all right.

DR. LAINE: Dr. Ross failed, purposely perhaps, to make an estimate of what it cost when a man died. It would largely increase the cost of the sum total.

THE PRESIDENT: That would depend largely upon where he dies, I suppose.

DR. ROSS: The expense of a man's death is inevitable. If he dies prematurely of typhoid fever, it is only the case sooner than it otherwise would, and that is the reason I left funeral expenses out. Talking about funeral expenses, I think that some action ought to be taken to correct an impression among the people about funerals. How often do we see a poor widow, for instance, whose finances have been exhausted by the expenses of the attendance upon a sick child or a sick husband, and when death comes in the family and the funeral expenses come along, how often do we see that poor woman incur an expenditure that it takes her a whole year or more to pay, in order to bury her relative decently, as it were. The idea I want to get at is that the expense of funerals is out of all proportion; it is money thrown away, and it is a great load on a great number of people. The wealthy can indulge in those luxuries, but the poor try to keep up and do all they can for the dead, and they incur an indebtedness that it is hard for them to pay.

It is a false notion. If we could do anything to correct that false notion, we would be doing good.

I have not much to say on this paper. I tried to make it practical, and to use few or no technicalities; to make it a paper that would impress the laity, or anybody who might read it, with the importance of using measures of prevention in all diseases that are preventable, rather than to take no measure at all or to use no action to adopt sanitary measures that would prevent the disease altogether; rather than to let disease go on and use money for its cure.

DR. P. C. REMONDINO, of San Diego: I wish to say something, not in reference to this paper, but in reference to a remark that the doctor made in his closing remarks on a subject foreign to the paper, yet a socialistic question which interests us all; and that is the expense of funerals. There is a canton in Switzerland where everybody is buried alike, rich or poor, and the State pays the expense of the whole thing. Unfortunately, with us there is as much rivalry as to the size and pomp of a funeral as there is at a party, which is all wrong. It would be better if we could have some system by which we could all be buried alike or cremated.

FACILITIES FOR THE TREATMENT OF CONTAGIOUS AND INFECTIOUS DISEASES IN THE PUBLIC INSTI- TUTIONS OF CALIFORNIA.

THE PRESIDENT: I received a paper and a letter from Dr. Osborne regretting that at the last moment the press of business at his institution necessitated his remaining at home, and that it would be impossible for him to be here, a pleasure that he had been looking forward to, as he is a man of ability and one who takes a lively interest in these things. He has prepared a very interesting paper, and I don't know but it would be well to read it or have it read. What is the pleasure of the convention?

DR. C. A. RUGGLES, of Stockton: I will state, in regard to this paper, that I am familiar with its history, its inception and conception, and with the reasons why the Doctor is not here.

Last January, in the discharge of its official duties, the State Board of Health visited the Glen Ellen institution, the Home for the Feeble-Minded. We made a very thorough inspection of the institution, and we found one deplorable condition of things, which was the existence of thirty-five cases of tuberculosis, scattered hither and yon all over the institution, without any idea of isolation or segregation. The Board immediately and thoroughly and positively condemned any such condition of things. We were struck almost aback with astonishment to find among four hundred patients thirty-five cases of communicable disease. The Superintendent of the institution immediately fell in with the proposition that something must be done. If the State desired to get rid of those four hundred, it was not doing a more successful act than allowing those thirty-five children with tuberculosis to remain where they were. But it could not be done with the approval of the State Board of Health. We communicated with Dr. Osborne in relation to the matter, and I, being familiar with some of the members of the Board of Directors and somewhat acquainted with our Governor, it is

determined and understood positively and unequivocally that next month there will be a separate ward constituted. A separate corps of attendants will wait upon those thirty-five children, and they never will be allowed to associate with the other three hundred and fifty. The gentleman, unfortunately, is not able to be here. I am very sorry, indeed, because I am satisfied his is a very good paper. Therefore, if there be no one to read the paper in his stead, I move that it be read by title and referred to the Committee on Publication.

(Motion seconded and carried.)

Following is the paper prepared by Antrim Edgar Osborne, M.D., Ph.D., Superintendent California Home for the Care and Training of Feeble-Minded Children, Eldridge, Cal.:

The following public institutions in California have cost the State, for land, buildings, water and light plants, furnishings, etc., up to August 1, 1895, the following sums set opposite their names:*

Insane Asylums—At Napa	\$1,726,435 04	
At Stockton	1,108,500 00	
At Agnews	812,614 99	
At San Bernardino	556,000 00	
At Ukiah	812,614 00	
Total		\$5,016,164 03
Reformatories—At Whittier	\$419,435 14	
At Lone	316,591 20	
Total		736,026 34
State Prisons—At Folsom	\$747,183 72	
At San Quentin	1,085,247 68	
Total		1,832,431 40
Institution for Deaf, Dumb, and Blind, at Berkeley	446,620 00	
Home for Adult Blind, at Oakland	54,873 60	
Veterans' Home, at Yountville	166,421 00	
Home for Feeble-Minded, at Eldridge	463,718 81	
Grand total		\$8,716,255 81

Besides the additional yearly cost for maintaining patients in these institutions†, for which the sum of \$1,391,126 70 was appropriated for the year ending June 30, 1896, the State paid in 1894, for the support of orphans, half-orphans, foundlings, etc., as follows:

To various Orphan Asylums, for 4,582 persons	\$284,533 20
To County Hospitals, for 19 persons	537 44
To outside aid, for 909 persons	30,380 70

Making a total of 5,510 persons thus cared for, at an expense to the State of.. \$315,451 34

* See State Blue Book for 1895.

† Veterans' Home	\$45,000 00
Whittier State School	100,000 00
Preston School of Industry	50,000 00
Stockton Insane Asylum	202,500 00
Napa Insane Asylum	200,000 00
Agnews Insane Asylum	181,000 00
San Bernardino Insane Asylum	58,400 00
Mendocino Insane Asylum	72,500 00
Deaf, Dumb, and Blind Institution	59,650 00
Home for Adult Blind	25,000 00
Home for Feeble-Minded	70,000 00
San Quentin State Prison	147,576 70
Folsom State Prison	108,500 00
Transportation of patients and prisoners	70,000 00

Total

\$1,391,126 70

It is to be presumed that when the State takes up a line of public charity, philanthropy, or expedient care, and commits itself, by lavish appropriations, to sustain its position in such matters, it will be found, as a consequence, that the means employed, being the resources of the commonwealth, will be wisely directed to procure in every detail a service practically above criticism. I say this is the rational presumption; it finds its popular expression in the oft-repeated assertion, "that whatever the State undertakes to do, it can afford to do well." To ascertain how well the State had made provision against contagious disorders in the various institutions in California, I recently made inquiries of the various managements. The replies courteously forwarded are, in the main, submitted herewith, and will be found, I think, exceedingly suggestive to a body such as this. No replies were received to my request from either Napa or Agnews Insane Asylums.

INTERROGATORY ONE.—"What facilities does your institution possess for the treatment of contagious or infectious diseases?"

Replies: Stockton Insane Asylum—"We have no facilities for the treatment of contagious or infectious diseases. The invalid ward of the Asylum, situated over the associated dining-rooms, and completely isolated from the buildings, would be the ward we would use for the present, in case of an epidemic here. Being on the second floor, it is, of course, not very convenient."

San Bernardino Insane Asylum—"We have no special facilities for the treatment of such cases; neither have we any buildings available for such cases."

Mendocino Asylum for Insane—"No means of secluding contagious disorders."

Whittier State School—"We have a pesthouse, situated away from the other buildings. It consists of one good, large, well-ventilated room."

Ione State School—"None whatever. At the mercy of any disease which may endanger health."

Folsom State Prison—"We have no hospital, separate and distinct, for any particular line of disease."

San Quentin State Prison—"We have no especial facilities for the treatment of contagious or infectious disorders, further than the hospital proper, which has accommodations for about forty-five patients."

Institution for Deaf, Dumb, and Blind—"This institution possesses no facilities for the treatment of contagious or infectious diseases."

Home for the Adult Blind—"Facilities for treating contagious or infectious diseases very crude. No separate hospital building."

Veterans' Home, Yountville—"No separate building has been set apart for such purposes. Should a contagious disease develop in our Home, we could treat by isolation by occupying a separate building that is now used for company quarters."

INTERROGATORY TWO.—"Have you a hospital building available for cases referred to above? If so, describe fully the uses to which it is put, giving outline plan and accommodations afforded."

Replies: Stockton Insane Asylum—"No; answered above."

San Bernardino Asylum—"Have no buildings available for such cases."

Mendocino Asylum—"No buildings available for such cases."

Whittier State School—"Our hospital consists of a ward situated on fourth floor of the main building, and will accommodate about twenty patients."

Ione State School—"Have no quarters available for such cases."

Folsom State Prison—"We have a hospital building for general use in the prison. It is large, well ventilated, and kept very neat. We have the usual hospital accommodations."

San Quentin Prison—"Answered above."

Institution for Deaf, Dumb, and Blind—"We have no hospital, but hope to have, one of these days."

Home for Adult Blind—"No separate hospital building."

Veterans' Home—"We have one general hospital of two hundred and fifty beds. The upper story is divided into a large dormitory, nicely fitted up with all the modern appliances, well ventilated, furnished with the latest style of plumbing, patent water-closets and urinals, stationary porcelain bathtubs, etc. The lower story is divided into wards."

INTERROGATORY THREE.—"About what per cent of your patients are consumptives?"

Replies: Stockton Asylum—"Not over one per cent. There are ten cases of pulmonary consumption in the male department; one case which is doubtful, and one case of tubercular joint trouble. In the female department there is but one case of pulmonary consumption and two cases of glandular disease, suspected of being of a tubercular nature."

San Bernardino Asylum—"The number of consumptives committed to this institution does not exceed five per cent."

Mendocino Asylum—"Since we opened this asylum (December 12, 1893) we have had but four deaths from consumption, and we have but one case in the asylum at the present writing (March 11, 1896)."

Whittier State School—No data.

Ione State School—"Have no data; but do not think it is over two per cent. We have but one well-defined case at present (March 10, 1896)."

San Quentin Prison—"Of the deaths (19) for the year ending June 30, 1893, ten were from pulmonary consumption; per cent, 58.82; population, 1,216. Same statistics for 1894 give total deaths, 37; population, 1,307; deaths from consumption, 13; per cent, 38.23. Same for 1895: population, 1,278; total number of deaths, 28; from pulmonary consumption, 11; per cent, 47.82. Average for the three years above gives a percentage of 45.94 of pulmonary consumption."

Deaf, Dumb, and Blind Institution—"No consumption."

Home for Adult Blind—"In ten years six cases of consumption out of a total of two hundred admitted; three per cent."

Veterans' Home—"No data. Percentage thought to be light."

INTERROGATORY FOUR.—"Have you facilities for the isolation of consumptives as a class? Do you isolate consumptives?"

Replies: Stockton Asylum—"The facilities which we have for isolating consumptives are faulty; still we isolate them to the best of our ability. With the exception of one case, I think all the consumptives of my department," writes Dr. Hoisholt, "are in one ward. Having so

few cases of consumption, we cannot isolate them as we would wish, nor keep them from actual contact."

San Bernardino Asylum—"We have no facilities for the isolation of consumptives as a class, except a small room in the attic, where, during the cooler months, we are able to keep a case or two."

Mendocino Asylum—"Have no means of isolating cases of consumption."

Whittier State School—"Do not admit consumptives to the institution. Have probably twelve inmates who have weak lungs, who would develop pulmonary consumption if given the proper conditions. They are not isolated."

Ione State School—"No facilities for separate care of consumptives. Present case is kept in the open air as much as possible, and mingles with the others only when a necessity exists."

Folsom Prison—"No special quarters for the isolation of consumptives. Would isolate if we had facilities."

San Quentin Prison—"No facilities for the isolation of consumptives."

Institution for Deaf, Dumb, and Blind—"No facilities for the isolation of consumptives."

Home for Adult Blind—"Now preparing a sunny, well-ventilated room for the exclusive use of consumptives, but do not seclude entirely. Have but one case on hand now (March 13, 1896)."

Veterans' Home—"As far as possible, consumptives are kept apart by themselves. During pleasant weather they are placed in comfortable, wheeled chairs and taken out in the open air."

INTERROGATORY FIVE.—"What is your opinion as to the effect upon the health and mortality of your other patients, of allowing consumptives to mingle in the general wards?"

Replies: Stockton Asylum—Dr. Hoisholt reports: "I cannot say that I have ever traced any case of infection by contact."

San Bernardino Asylum—Dr. Campbell reports: "During my eleven years' service as physician to the Illinois State Penitentiary, situated at Joliet (average population, 1,500), I had ample opportunity to study this question. In at least four of my biennial reports I drew the attention of the authorities to the unfortunate results from the unavoidable necessity of having so large a population confined to so small an area, and the disastrous effects resulting from the commingling of consumptives with the non-consumptives. During my years of service there was a steady increase in the percentage of consumptives—not owing to new commitments, but to its propagation among those already confined. The fact was as striking and convincing as it was deplorable. With our present knowledge of tubercular consumption, it seems to me there can be but one opinion regarding its contagiousness and the disastrous results of the mingling of consumptives with other patients. There have been three deaths from consumption in this institution since it opened (August 11, 1893), but a number of others have been removed by their friends that they might care for them at home during their last days. Population of the institution at present writing (March 16, 1896), 435."

Mendocino Asylum—Dr. King writes: "There ought to be provision made in all large hospitals to separate persons afflicted with contagious diseases from other patients, and the same is true outside of hospitals as well as inside. Number of deaths since opening of institution, 60; deaths from consumption, 5; population (March 10, 1896), 322."

Whittier State School—Pronouncedly in favor of the isolation of consumptives as a class.

Ione State School—Superintendent Bank considers it very unwise and prejudicial to the interests of the other children to allow unlimited freedom to consumptives. They have had but two deaths since the opening of the school—neither from tubercular trouble. Present population, 187. The management contemplates having passed an amendment to their law regulating admissions, to the purpose "that no boy of unsound mind, or who is afflicted with epilepsy, St. Vitus dance, or any contagious or infectious disease, shall be committed to the school." This would bar consumptives.

Folsom State Prison—Dr. C. L. Browning states: "From my general experience it is not a good idea for consumptives to remain in the same wards with other patients, or with other people. In my opinion, consumptives should be isolated, if it is possible. In Folsom Prison we have an institution that is different from most other institutions, from the fact that we have plenty of help, plenty of cleansing material and cleansing fluids, plenty of paint and whitewash, and for these reasons the wards of this prison are at least as clean, or cleaner, than any other institution in the United States. There is hardly a crack on the inside of the institution, or in the walls, but what is thoroughly cleaned out every day, and disinfected, and for this reason I would say that the mingling of consumptives in the general wards of the prison has no untoward effect upon the health of the other prisoners. Folsom Prison, up to within the last few years, had the name of being rather a sickly prison, and prisoners have tried to avoid it as much as possible, but we have dissipated that idea. In fact, we have got one of the healthiest prisons in the United States to-day, and we are taking particular care in keeping it as clean and healthy as possible. The health of the prison in 1896 has been better than it has been for the past three years. We have had very few deaths, and very little sickness outside of malaria. For the fiscal year 1893-94, with an average population of 690, there were reported six deaths, one of which was from pulmonary consumption. For the fiscal year 1894-95, with an average population of 792, there were nine deaths, five of which were from pulmonary consumption."

San Quentin State Prison—Dr. Lawler states: "In my opinion, it is advisable in the extreme to prevent the mingling of consumptives with other patients. Number of inmates (March 14, 1896), 1,261."

Deaf, Dumb, and Blind Institution—"Have had no deaths in two years. Present enrollment, 214 pupils." Professor Wilkinson expresses no opinion regarding the danger of letting consumptives mingle with other children.

Home for Adult Blind—Dr. Fine advises the keeping of consumptives to themselves, as far as possible, and the use of all possible means to prevent the indiscriminate scattering of sputum. Deaths for the past ten years, 15, six of which were from consumption. For the same period, 200 were admitted. Population March 13, 1896, consisted of 95 inmates.

Veterans' Home—Medical Director McAllister favors isolation of consumptives, especially of the more advanced cases. Total number of inmates, March 13, 1896, 641. Number of deaths for the year ending June 30, 1895, 35.

When the above-referred-to questions were sent out, I felt that it would be found that the Home for Feeble-Minded possessed fewer and poorer facilities for the treatment of contagious diseases than any other institution in the State. It would appear, on the contrary, from the answers given, that it is neither materially better nor worse off than the rest of them. At Eldridge we have, practically, no facilities for the treatment of these diseases by seclusion or isolation. We have, as the above infers, no hospital building, nor yet wards that might be devoted to hospital work. The different departments of the Home are overcrowded to a degree that well demonstrates the inferiority of the present style of State institution buildings and extension over the cottage system of care. The sick are necessarily cared for in their own beds, wherever these may happen to be, with, of course, such extra attentions to privacy as a screen around the bed, or some such appliances, can secure in the dormitories.

A very large percentage of our patients, particularly those admitted during the past two years, are of the lower grades mentally and physically. Coupled to their mental defect, sometimes as the cause, sometimes as the complicating concomitant, are the commoner hereditary constitutional disorders. Out of an inmate population of 440, we have at least ten per cent suffering from pulmonary consumption in some stage or another, or exhibiting tubercular, glandular, and scrofulous infection. During the past ten years of my management of this institution, I have seen this percentage rise from less than one per cent to its present rather alarming figure. As the Home grew, the influx of patients outgrew their quarters, thus producing an unfortunate overcrowding, with all its attendant evil results to health. The admission of a few cases of pronounced consumptives did the work for us. Lacking the barest requisites for their rational hospital care; handicapped in more ways than I would like to disclose in a paper such as this, I have been compelled to be an unwilling witness to the manifest dangers involved in the unrestricted commingling of these consumptives with our other and healthier patients. To a student, the field has been most fertile of results and rich in clinical demonstrations. I have had demonstrated to my entire satisfaction—yea, to my unspeakable distress and sorrow—the contagiousness of consumption under such circumstances.

I believe these dangers constitute a standing menace in all our public institutions. I cannot believe that there is less danger from the intermingling of consumptives with the insane, the criminal, or other classes than with the feeble-minded.

At Eldridge we are moving to have erected separate cottages for the care and treatment and comfortable isolation of consumptives. I have long advocated this plan, but unfortunate delays have interfered with its realization. Briefly, it seems to be the only thing for us or any other institution to do; with us, just now, it seems to be the imperative thing.

Investigation into some thirty orphan asylums of all denominations in the State, drawing State aid to the extent of \$284,533 20, in 1894, and caring for 4,582 children, shows a little better condition of affairs on the whole than the above record for our public institutions in these matters. The orphan asylums under the charge of the Roman Catholic Church, particularly, appear to have been better provided for along these lines, and are being managed with stricter attention to these

details. The proposition stands, however, that where the State appropriates such vast sums of public money for the care and treatment of dependents, delinquents, and defectives, any gross disregard of true sanitary conditions is almost criminal neglect, and calls for immediate remedial attention.

The object of this paper is simply to call attention to the above enumerated facts, the consideration of the proper steps to be taken in the matter being left to others. The writer cannot resist the temptation to seize upon the opportunity thus afforded him, however, to again declare his belief in the wisdom of building our institutions on the colony plan, and of providing comparatively inexpensive cottages for inmate care, as against the idea of the expenditure of millions upon architectural monstrosities, as has heretofore prevailed, and which rarely, if ever, possess the interior facilities which the class of patients they are designed to shelter, of right demand.

IMPERATIVE NEED OF STRICT SANITARY REGULATIONS AGAINST THE SPREAD OF CONSUMPTION IN SOUTHERN CALIFORNIA.

By P. C. REMONDINO, M.D., of San Diego, Cal.

If we accept the belief in the infectious or contagious nature of tubercular consumption, we must also accept the belief that Southern California requires a more strict code of sanitary regulations, as well as a better understanding concerning the nature of the disease in question, than it has heretofore enjoyed. If the prevalence and spread of the disease are to be checked or circumscribed, it will only be through such means as are usually taken to effect the suppression of other contagious or infectious diseases. Public education, and the demands that the result of a better education of the public will create, will tend greatly to assist matters; but to do all that is required, in the light of the present knowledge of modes of infection, and of the preventive measures adequate for its prevention, will necessitate something more than the mere education of the masses. This will only be accomplished by the enactment and enforcement of strict regulations.

These regulations need not, of necessity, work any additional hardships on the already afflicted invalid, as they should only contain such provisions as would naturally suggest themselves to the intelligent invalid, whose consideration for the welfare of others would not permit him, consciously or unconsciously, to become the center or a source of infection, or a careless disseminator of the disease. There is, however, unfortunately, a very large class who, either through ignorance or an unpardonable hostility to all that is sensible, persist in causing the public to run unnecessary risks to the infection. It will certainly not be a hardship on the part of those afflicted to be obliged to do that which common sense dictates as practicable and not burdensome to their more intelligent and considerate fellow invalids; nor will it be an exercise of cruelty or of persecution that the State should compel those who are careless and inconsiderate to observe such regulations as are best intended for the protection of the well.

Such regulations should be observed by all consumptives afflicted with tuberculosis. The danger is by no means limited to those in the

most advanced stages of the disease, although it is from the latter class that is obtained the greatest degree of infectious material. The history of the New England skipper who infected three successive wives who died of consumption, while he himself seemed not apparently to suffer from tuberculosis, but who was subsequently found to have been suffering from the disease for many years previous, is also a lesson that should make us reflect. All pulmonary diseases are not, however, tuberculous; neither are all cases of emaciation necessarily tuberculous affections. The sifting apart of these different cases will require much unprejudiced discrimination and care, as well as the exercise of all our judgment; but, through it all, we should never overlook our duty to the well as sanitarians and as practitioners of preventive medicine, nor should we lose sight of that thoughtful humanity which the condition of the invalid demands that we should exercise.

Southern California, more than any other locality, has been sought as a health resort by the pulmonary invalid. Unfortunately, the rationale of climatic therapeutics is not understood by the laity at large, who should understand that climate should be used more in a prophylactic than in a curative sense; in other words, that it should be used rather to prevent the development of the disease in its incipency or tendency, than—as it is in the great majority of instances—as a hopeless curative agent. Many patients carry the latter delusion to such a stretch as actually to leave their Eastern homes in a moribund condition, while their lungs are in the very last stages of decay. Some of these are so far moribund that they die on the cars or at some roadside station long before reaching these shores; others come here merely to die within a week or a few months after their arrival. In some of these cases the disease has affected the intestines as well as the lungs, and such are, from their condition, the most active and fruitful sources of infection. The Southern California climates cannot help these, unless it be that the milder and more equable climate, as well as the cooler nights, tend to make their last days more passable and their ending less painful than it would be in their Eastern homes. But we cannot shut our eyes to the fact that, in our careless ways of treating these invalids, at least as far as concerns the protection of others, and in a preventive sense, it is from these that comes the greatest danger to our pullmans, our steamers, our hotels, and to our boarding or lodging houses, as well as to many private families, who, ignorant of the requisite preventive measures for their own protection, as well as totally ignorant of the infectiousness of the disease, take in invalid boarders or lodgers.

The ignorance exhibited by the laity in these regards is very apparent from the great number of Eastern consumptives who come to these shores expecting to dwell with their friends, when it is patent that did they but recognize the true infectious nature of their illness, they would be the last to cause the exposure of those whom they love. I have more than once been called to assist an intelligent family from the presence of one of these undesirable visitors, as the family fully realized all the risks that the presence of the invalid caused them to incur. It is hard to appear unfriendly or heartless to the poor invalid; but harder still is it for the one who fully realizes all the possible dangers, when called upon needlessly to expose his own family to the infection of tuberculosis.

From the above outlined description of the nature of the sources of the infection of tuberculosis, it will be seen that, to be effectual, it will not

be sufficient to make our regulations fit our cities or our towns and villages—we must make our regulations cover the whole region, and they must extend so as to cover even the railroads and other avenues of travel.

Consumption is a far more fatal disease to humanity than is smallpox, but somehow, from the fact of its often slow progress, and from the further fact that persons afflicted with the disease are often able to attend to business, to travel, and, in a measure, to enjoy life, we fail to grasp the full danger to the well that surrounds the presence of the consumptive. Were a smallpox patient to be seen sitting in a waiting-room, the whole building would soon be vacated; but persons will not only breathe the air respired by the consumptive, but also will drink out of the same glass or cup at the water-cooler, wipe on the same towel at the towel-rack, and eat with the same hastily wiped knives, spoons, and forks at the restaurant, just as if the tuberculous bacillus was as far distant as the slaughtering Turks in far-off Armenia. This is not as it should be. Either tuberculosis is an unimportant and uninfectious disease, or it is an infectious and slowly invading, but surely fatal, disease, and one that is easily communicated through its germs. We all well know that the latter of the two conditions is the true state of the disease, and our shiftless and careless actions, in the light of the great spread of the disease, are not in the least creditable to our intelligence, considering the positive teachings of science.

What can we do and what should we do to protect the well and prevent the spread of the disease? It goes without saying, that what can be done should be well and thoroughly done, and that in enforcing our well-digested regulations in this regard, we will not only protect the well and prevent the spread of infectiousness in the future, but also we even assist and increase the chances for the recovery of the ailing, as these, after a partial recovery, often fall victims themselves to the results of a secondary or a tertiary infection. It is therefore as much to the interest of the incipient consumptive, and of still more interest to the possessor of that unfortunate constitution which simply inherits a *tendency* to consumption, as it is to those who are well and possess strong stamina, that something should be done.

Of late years, and since the ravages of the grippe, many previously well and healthy persons have had their health and stamina so undermined that they have become easy culture-fields for the lodgment and propagation of the bacillus of tuberculosis. The deteriorating effect upon these constitutions, through repeated attacks of the grippe, has made of many as so many well-spaded, well-manured, and well-watered garden-beds, where the seeds have but to fall to at once germinate. Southern California—as well as Middle and Northern California, and on that our sectional interests are identical—is now peopled by many such, who have found that a longer residence on the Atlantic coast or in the valleys of the Western rivers, or on the shores of our great lakes, meant a speedy breakdown, a life of impaired or of stopped usefulness, and probably a speedy ending. Hence, our population with a *tendency* to consumption has of late years largely increased, and is still more largely on the increase. It is that class, did they but know the dangers that threaten them, who should strenuously demand protection—not a protection against foreign immigration, nor protection of the McKinley order as against foreign manufactures or foreign pauper importations, but a protection against consumption for their enfeebled

health and powers of resistance. That class should fully understand what this means to them, and they should as fully realize what a lessened resistance means. They should understand that, while they have minimized their chances of a further breakdown, or of falling victims to consumption, these chances have only comparatively been lessened but not wholly removed, and that the desiccated and pulverized sputa of the consumptive may, in a certain degree, be as deadly to them here as in their old home, and that they should not take any chance as to the degree that is required to infect them.

As suggested, our preventive measures should begin with the railroad trains when they cross the State line—beyond that our Legislature or our Boards of Health cannot exercise any authority. As lately suggested by some of our progressive Eastern railroad surgeons and sanitarians, consumptives should travel in cars specially constructed for their accommodation. The furniture of these cars, and their general arrangement, should be such as would permit a thorough steaming and fumigation at the end of each single journey. The closets of these cars should be so constructed that before emptying their contents upon the roadway, or near the station platforms, the contents of the pan could be thoroughly asepticized by an efficient bichloride solution. The cuspidors of these cars should be of the most approved sanitary pattern, and cleansed and disinfected often. The bedding of these cars should be disinfected at the end of each single journey, and it, and what rugs are used in the cars, should not be used until the next trip; but, after steaming, they should be well aired for some days. These cars should be supplied with an especially trained service. By these means the regular temperature of the car, and everything that pertains to the health and comfort of the invalids, would be better attended to, and the thorough disinfection of all discharges, cuspidors, etc., would be better assured. No towels, bedding, or other furnishings serving in these cars should be permitted to become mingled, either in the laundry or in a store-room, with those that belong to the other class of cars.

Hotels should not, as at present, indiscriminately take in and lodge the consumptive. The rooms occupied by these should be easy to disinfect, and hotels should in these regards and in every particular follow the suggestions made concerning railroad cars. Some consumptives are but too often viciously and criminally careless, and at times even seem to take a grim delight in doing that which is obnoxious and disgusting as well as dangerous to others. We have seen such, spitting small lakes of sputa on sidewalks or on hotel porches, or on the cover of a cuspidor, so as to be able to inspect it themselves. Flies light on the outskirts or borders of these little lakes and convey the infectious germs to the fruit-stalls, markets, kitchens, dining-rooms, and dwellings. The most rigid and well-enforced regulations should cover that phase of the subject. Consumptives should carry with them the wherewith to expectorate into, and when this is saturated, full, or at the earliest convenience, it should be burned. A small rubber or oiled silk cloth pouch, and small, square pieces of cheese cloth, form an admirable receptacle and a supply of receivers that can be carried in the pocket. Under no pretext whatever should a consumptive be permitted to expectorate on a street, or station or hotel floor, or anywhere else, except in a receptacle that can be burned or otherwise thoroughly disinfected.

In this respect too much cannot be said condemnatorily of the popular

conception of the range and power of some advertised disinfectants to destroy the germs of disease and remove dangers or infection. Too much dependence is placed in a slight spray or a high dilution of carbolic acid, which only serves to blind us to the real danger and lull us into fancied security. Boiling water, superheated steam, and an efficient solution of corrosive sublimate are the only real destructives of the bacillus. A rag or a sponge dipped in carbolized water or in any of the ready-made disinfecting solutions, are hence of no earthly avail. The laity should understand this better, and not be lulled into a fancied but dangerous security. Such means cannot even sicken a tubercular germ, to say nothing of destroying it; and the laity should fully and well realize that the proper and only safeguard is prevention of the pollution or the infection of the soil, streets, walks, houses, and furnishings, rather than to have to depend on their subsequent disinfection.

In consideration of the observations made upon the breath of consumptives, upon graveyard soils in which deceased consumptives have been for years buried, and upon the clinging tenacity of the germ infection to walls, floors, and furniture, which tell us that the germ is often found in the expired air, that it will exist indefinitely in soils, and that the dust on walls has been found impregnated with the bacillus, it is very evident that our efforts should be complete and radical, and that our quarantine supervision should not cease with the death of the individual. Cremation of the dead is hence a sure safeguard, and to be recommended. The saturation of the body with a bichloride solution is also an efficient preventive. Walls wherein a consumptive has lived should be well sponged with a strong bichloride solution, which should also be applied to the floor of the apartment. Other articles can be steamed at the carpet and furniture cleaner's, where moths and other germs are destroyed by steam; or if the articles are boilable, they can be treated at home.

Consumptives should not allow a pet cat or dog to caress them, or to eat the remains of their food. Animals owned and living with consumptives should not be allowed to wander about and be petted by children.

Hotels harboring consumptives, especially those in the advanced stage of the disease, should never, in sending meals to their rooms, send up sugar, salt, pepper, nor any other article of food or of condiment, especially milk and butter, which may find its way back to the general pantry and be in some shape or other served up to others. We have seen this dangerous procedure take place more than once, where a consumptive has dipped a spoon directly from his mouth into a teacupful of sugar or into a small individual sugar-bowl, or dipped salt out of a salt-cellar with the end of his knife—the salt in the receptacle being afterward emptied in a common lot from whence the cellars were all to be refilled. Too much care cannot be exercised in this direction.

The greatest of cares naturally centers upon the disposition of the sputa. The common practice of promiscuously spitting should be strictly prohibited. Persons in all stages of health and with every variety of disease spit at random over the floors of public halls—especially is this the case at political meetings and conventions—to desiccate, become pulverized, and be sent up in atomized clouds of infectious dust during the uproarious applause that often is the accompaniment of such public reunions. Were I a life insurance company director, I should certainly see to it that the proverbially steady convention attendant, who makes it his occupation to be a standing delegate to all

things, should be classed as an extra hazardous risk. In such a place the sputa deposited upon the floor become more than dangerous, owing to the great stamping of feet, which fills the air with a dust of almost unrespirable thickness. In all such assemblages the most approved pattern of cuspidors should be used, and all of our public places should be well supplied with easily disinfected cuspidors. An intelligent sense of self-preservation should abolish the wild and uproarious stamping of feet and the barbaric pounding upon the floor with the ends of our canes. Some more civilized system of exhibiting our approval should be inaugurated.

There is a prevailing idea that sawdust or soil is sufficiently disinfecting, and that sputum deposited upon the ground is speedily rendered inert. This is all fallacious, at least as far as tuberculosis is concerned, and the consumptive who goes about expectorating upon garden-beds is simply placing his bacilli where they will the best hold on to life and be made capable of future mischief.

The breezes from off the Pacific Ocean are more or less charged with that ozone which is destructive to bacillary life, and the bright, warm sun of the southerly latitudes of our State is equally inimical to its existence; but to make these two agents effective the sputum must be so placed that it will remain freely exposed to their action until it is rendered completely inert. To obtain this result, however, the sputum must not be exposed to being blown about into shady and protected places. From these reasons, sputum deposited in the sunniest and windiest part will in the end become dangerous by some of its particles being blown where the vitality of the bacillus may be indefinitely preserved.

A very injurious practice prevalent in Southern California is the habit of taking in "roomers," regardless of the nature of their physical condition. While, in the main, that is a most Christian and unselfish act, and at times even most profitable, it is but too often the initial point from whence the family of the owner of the house or home begin their journey as a race of consumptives. I have known, not only of instances where very desperate cases were taken in, but also of cases where they were made as one of the family. This is all wrong, and while it is a most Christian act, the father or head of a family has no moral right thus to jeopardize the future physical welfare of his innocent family. If the reckless colonization of consumptives continues under the lack of understanding of the subject, and the utterly as reckless disregard of all hygienic regulations or laws, not only will our coast become a dangerous habitation for the invalid whose disease is only that he has a *tendency* to the disease, but also it will, in time, become an exceedingly dangerous habitation for the well who are born here, and who have no hereditary tendencies to consumption. The reports from many of the health resorts on the northern Mediterranean shores warn us but too well of our impending fate, unless we take proper precautions. By the enactment and enforcement of proper measures, we not only protect ourselves, but also make the chances of the existing invalid better, and the sooner we recognize the fact that the air of every locality that is a health resort cannot of itself destroy all disease germs, the better it will be for all concerned. The preservation and existence of the germs will, in a degree, lead to the development of the disease here as well as elsewhere, and the great congregation of those afflicted with the malady will, in the end, so saturate many of our homes and public

places with the germs of the disease that, in the language of the ritual, there will be no further health in us.

With great carelessness, it is not in the least unreasonable to entertain the opinion that the disease may assume, under favoring conditions, an endemic as well as an epidemic form. No degree of pleasing optimism will do away with that unwelcome condition or result. It therefore behooves us to take the most prosaic view of the subject, and, without going to the lengths which many extremists would advise, we can do much in circumscribing the spread of the disease by guarding against infection. To do that we must not overlook the fact that we must do more than to simply guard against from person-to-person infection, as, however much of the existing prevalence of the disease may be due to direct infection, the greater number of cases undoubtedly become so from infected rooms with their germ-infected furnishings, as well as from dust infection on streets, in travel, or through the food, while in an inceptive state of the system. We must most carefully and assiduously, as well as constantly, guard against the infection of our soil, of our walls, floors, furnishings, books, bedding, and general household utensils. To that end we must, first of all, possess some means of enforcing the most complete preventive measures on our various lines of travel. Next, the hotels and boarding and lodging houses should come under like supervision. In hospitals the consumptives should be kept apart from the rest of the inmates. Surgical cases are prone to the infection if operated upon or confined in rooms or wards that have been occupied by consumptives. Then, in the end, the heads of families wherein a member is a consumptive, should be taught the necessity and benefit of all possible precautions in protecting the rest of the family.

The best manner of accomplishing the desired preventive measures should be the subject for study by our local and State legislative bodies. The necessary details will suggest themselves, as well as the manner in which the regulations should be enforced. Much depends upon the differing intelligence of the afflicted themselves, as well as upon that of the community wherein they reside.

DR. WALTER LINDLEY, of Los Angeles: Mr. President, Ladies and Gentlemen, I am not at all prepared to speak to the subject, not having arrived until the Doctor was pretty well through his paper. I believe in kindness, and while we take every precaution and insist on what the Doctor speaks of there, I believe at the same time in treating the man or woman who is suffering with a terrible malady with as much consideration as possible, and insinuating as little against his lack of human kindness as possible. I believe that if our literature were written in the manner of argument, and not in the manner of denunciation, it will reach these consumptives so that they will readily join with us in trying to eradicate the disease. I believe that this disease will be eradicated by the steps which the Doctor suggests, but, at the same time, let us season our arguments and our literature with as much consideration for the unfortunate as we possibly can.

DR. W. F. WIARD, of Sacramento: I listened with a great deal of interest to the very able paper of Dr. Remondino, and I indorse everything the Doctor has said, the remarks which have been construed by Dr. Lindley as a little harsh and cruel included. I want to say what I have said before all the meetings of this society, that all the kindness

in the world will never accomplish anything. I shall never take a tuberculotic into my family under any circumstances whatever, because I consider my family's good health of more importance than any consumptive's necessarily brief existence. Furthermore, I do not believe in allowing—and here I think the strong arm of the law should be brought into requisition—I do not believe in allowing teachers in our public schools who are afflicted with tuberculosis to retain their positions, or to be allowed to teach there one day after it is understood that the disease is well developed. I do not believe that a preacher should be allowed to preach and associate with his parishioners, as he necessarily must, if he is afflicted with this disease. I do not believe that it should be allowed by our State. I do not believe that the coming here of medical men who are broken down with consumption, and practicing and associating with the people, as they necessarily must, should be allowed. Their work must necessarily go in the direction of broken-down constitutions, of people who, by heredity and association with others, are in poor health and extremely liable to take consumption—to be infected by these germs. It seems as though it was an immense wrong for us to allow these things to go on. We know that in all probability the man who drinks whisky is going to, ultimately, and in a very few years, become disabled by it, and we make laws to regulate the sale of that. Now is it any more out of our jurisdiction, is there anything more wrong about it, to regulate this disease and control it? Shall not we say to these men who are in these vocations where they are necessarily associated with a great many men—isn't it proper that we should say to these men, "You must get out of there; you are exposing this community to a very fatal contagion; we don't want you in there; let somebody else do that work who is not afflicted with disease"? It seems to me this is a plain proposition, and I sincerely hope that ultimately we will have laws which will regulate these things. Kindness won't do it. I believe my heart is just as tender as that of the majority of practitioners, and I feel sorry for these people who are afflicted; it is deplorable, but I tell you they have got to stand aside and let somebody else with good health do this work, or we will do an injustice to our community.

DR. J. R. LAINE, of Sacramento: I do not expect to enlighten any one by stating the manner in which the infection will take place. It is generally understood, I believe, that a person may live in intimate relationship with another one who is suffering from tuberculosis and yet not contract the disease from him, unless he furnishes the soil which receives it, so that it may develop, by breathing bacilli in a dry state, as dry sputum. There are other methods also, particularly among cattle. Cattle that are suffering from tuberculosis have two ways of spreading the disease: one from coughing on the feed and grasses that other cattle graze and feed upon; the other, by the excreta from the bowels, provided the disease exists in the alimentary canal. This, when it becomes dry, becomes scattered over the feed, and may reach the respiratory lining of other animals, or may infect them through the stomach. I do not believe that people often contract the disease from others through the food. Children, at the time they are cutting teeth, or at the time they are suffering from some abrasion of the lining of the mouth, if they are nursing or drinking tuberculous milk, may receive it in that way. The glands about the neck may become enlarged and suppurate and swell, and that bacilli may extend down to the apex of the lungs, and reach

the lungs in that way. Then again, as stated by the writer of the paper, a patient may be suffering from a small area of affected tissue, and by swallowing expectoration may infect the alimentary canal; or again, by respiring his own bacilli, that have been dried, he may infect a portion of the opposite lung, and so carry it on indefinitely. I am not a believer in the easy communicability of tuberculosis by breathing respirations of other persons. It is true that by coughing we create an expulsive effort, which, by acting as an atomizer, may expel a portion of sputum containing bacilli; but you must see that that is not easily inhaled by another person until it has become dried, comminuted, and scattered about as dust. It is far more dangerous to live in a room that has been occupied by a consumptive patient. There the carpets, or even the floors, if denuded of carpets, or the walls, or the furniture, will have a fine dust from the particles of sputum that has not been cared for, and that, when stirred about, may produce the same effect that people sometimes get when cleaning the paper off the walls of a room in which a patient had smallpox years before. They then wonder where they got smallpox, and they cannot understand that the bacillus has been retained all this time in some secluded spot, and has become displaced, and thus produced the contagion.

I would take the same position with reference to the school teacher that is taken by Dr. Wiard. I don't think we ought to have school teachers who are known to be afflicted with consumption taking care of our young. Putting aside the fact that they may not convey the disease by direct contagion, they must dispose of their sputa, and that sputa will become dry. There is a possibility, there is a grave probability, that the sputum may be dangerous to the young. That being so, let it be once admitted that that is so, we should not have them as teachers, no matter how much sorrow we may feel for their unfortunate condition. The love that we have for the young ones should overcome these sentimental considerations.

With reference to the clergyman, he stands in the same condition that almost any other man will. If he can care for his sputum I have no objection to listening to his exhortations.

How far the physician may continue his practice in the advanced stage of the disease is a matter that should be partly left to him and partly to those who advise him. I believe that generally physicians take the advice of everybody else but doctors.

ABBOT KINNEY, of Los Angeles: The only consolation in this very serious presentation of the subject—one consolation that Dr. Remondino has given some of us at least—is that there is a prospect for the extermination of politicians who attend conventions.

DR. J. R. LAINE: They have so much of the antidote in them that it don't hurt them.

DR. REMONDINO: With reference to the remarks of my friend Dr. Lindley, I must say that that is a point that has presented itself to me more than once, and very sadly. There are very few of us but have friends in that predicament, that are consumptives, and really if there is anything in the world that makes us wish there was a Utopia, that Utopia was something practical, that it was not a mere theory, it is that we have a consumptive friend and we don't know what to advise him to do or what shall be done with him. There is many a poor fellow who becomes consumptive, and if you go to work and shut off his means of

earning a livelihood, what shall he do? Is he to go to the poorhouse? You must give him some means, under our system of civilization (which does not provide for him), of making a living. For instance, here is a girl raised in refinement, belonging to a good family; she is refined in sentiment and feelings. That poor girl, through her attendance at the State Normal School, where she has aimed to become a teacher, through her assiduous occupation and confinement becomes consumptive. Are you going to tell that girl, "You are consumptive; you can't teach in our schools, but you must go to the poorhouse"? She may have no place to go; she may have no relatives to provide for her. These thoughts have often come to me, and I have often felt that the State ought to provide for such persons. In regard to teachers, it is not alone the disease that they may communicate to the children—and children will receive the infection much quicker than grown people—but here is a danger that I have seen more than once; I have seen in San Diego, where many of our teachers were consumptives, these teachers are thin-blooded and frigid, sensitive to the cold, and they are afraid of draughts, afraid of ventilation, like all consumptives. I have seen these teachers sit by and have a roaring fire in a room, and insist on having the windows closed and the doors closed, so that actually when a well man would come into that room it would make him sick; and I have seen children come home vomiting and sick from being confined in such an atmosphere. Whenever a teacher gets in that condition that she cannot stand a ventilated room any longer, she ought not be allowed to teach school.

Another thing: We are either right or wrong in saying that the bacillus will propagate the disease. Some take the ground that the bacillus is merely a concomitant of the disease, and some say that the presence of the bacillus in the lung is merely a secondary result of the trouble. Be that as it may, we know that it will infect persons.

And another thing: You talk about a person being well, and another being not quite so well being more subject to the infection; but we must all admit that you can take the healthiest person in the world, and let him have a sore in his mouth, and let a bacillus of a consumptive light on that sore, and it will impregnate his system. It will start a focus from which colonies will propagate in his system. The same way about a strong, healthy man being in no danger by eating food upon which some of these bacilli have been deposited. It may be true as long as there is no abrasion, but the slightest abrasion gives a point of entrance, and we cannot be too careful in that respect.

COLORADO DESERT AS A SANITARIUM.

DR. M. F. PRICE, of Indio: When I was asked to write a paper and gave this as a title, I was out on the desert away from home, away from every book of reference I had or could procure, and there was a very short space of time between that time and the meeting of this convention. While I commenced to write the paper, I have not been able to finish it in such a shape as to present it to this meeting. Therefore, I will have to be excused unless you will accept it by title and allow me to present it to the Committee on Publication.

[On motion of Dr. Regensburger, the Doctor's request was complied with. The paper is as follows:]

In the discussion of the possibilities of any locality or region of country as a sanitarium, the principal item to consider is naturally the climate. "It is almost an universal practice to measure the influence of a climate by the relation which different regions and localities hold to pulmonary consumption—a disease which, probably more than any other, depends upon preventable conditions intimately associated with a foul soil or density of population." (Bell.) What I may say on the subject in hand will follow this line of reasoning.

All writers agree in recommending the climatic treatment of consumption as the most important element in the care of those afflicted with the disease; but there is, perhaps, no climate to which consumptives can be sent indiscriminately. Some patients feel better in cold weather, but the large majority are better in summer and in a warm climate. "In the advanced stage of the disease, patients, if sent *anywhere*, should be recommended to a warm climate, and usually to a comparatively low altitude." (Ingals.) "The requirements of a suitable climate are a *pure atmosphere*, an *equable temperature* not subject to rapid variations, and a *maximum amount of sunshine*." (Osler.) A patient should live out of doors as much as possible under the "wonderful influence of the sun, the source of everything that is good in climate." Neither the cough, the fever, nor the hemoptysis contraindicate this. "Good climate is all out of doors." This question is of the very first importance in the treatment of tuberculosis. "It is illustrated in an interesting and practical way by the experiments of Trudeau, showing that inoculated rabbits, confined in a dark, damp place, rapidly succumb, while others, allowed to run wild, either recover or show slight lesions. It is the same in human tuberculosis. A patient confined to the house is in a position analogous to the rabbit confined to a hutch in the cellar; whereas, a patient living in the fresh air and sunshine has chances comparable to those of the rabbit running wild." (Osler.) An atmosphere as nearly devoid of moisture as possible is of great importance. This does not so much depend on the amount of rainfall as on the dryness of the soil. "The atmosphere of a region with a loose, porous, sandy soil, through which the water filters, and whose surface dries quickly, is never damp; but hard, compact, rocky, or clayey regions, that drain but slowly and imperfectly, hold the moisture, and cause a dampness which is a strong predisposing cause of phthisis." (Loomis.)

The foregoing is but a brief epitome of what has been written on the climatic treatment of pulmonary tuberculosis and with which all are familiar. With this preface I pass to the consideration of the climate of the Colorado Desert, which, I think, meets the requirements hinted at above more nearly than any other of which I am cognizant. This desert is situated in the counties of Riverside and San Diego, California, between the Coast Range of mountains and the Colorado River, and is below the level of the sea 300 feet at the lowest point.

The atmosphere of this desert is almost perfectly dry, the relative humidity being low throughout the whole year—15% to 50%. Dr. Denison says "an actually small amount of atmospheric moisture is the most important element in the best climate for phthisis." He formulates the relative humidity as follows:

For excessive dryness.....	40%
For moderate dryness.....	40 to 60%
For moderate moisture.....	60 to 80%
For excessive moisture.....	80% and over.

Humboldt's table gives—

Very dry	under 55%
Moderately dry	55 to 75%
Moderately damp	75 to 85%
Very damp	over 85%

Relative humidity is the amount of moisture in the air relative to what it could contain, the maximum being 100%.

The mean temperature and relative humidity at Indio for the first three months of 1896 were as follows:

	January.	February.	March.
Maximum temperature	80°	89°	95°
Minimum temperature	29°	31°	40°
Mean temperature	53°	68°	67°
Relative humidity	42%	33%	41%

I have not had access to any records except for the three months named. For the remaining nine months Dr. Walter Lindley reports the following for 1893: In April, the lowest was 50°, and the highest 100°. In May, the lowest was 60°, and the highest 105°. In June, the lowest was 70°, and the highest 111°. In July, the lowest was 75°, and the highest 116°. In August, the lowest was 78°, and the highest 116°. In September, the lowest was 70°, and the highest 113°. In October, the lowest was 50°, and the highest 102°. In November, the lowest was 30°, and the highest 90°. In December, the lowest was 30°, and the highest 80°.

The following table, showing the monthly means of dry and wet thermometers for 1895, is kindly furnished me by Mr. A. Ashenberger, Observer Weather Bureau, at Yuma, Ariz.:

1895.	Thermometer.			
	Dry. 5 A. M.	Wet. 5 A. M.	Dry. 5 P. M.	Wet. 5 P. M.
January	47.4°	41.9°	59.8°	47.9°
February	50.7	42.5	69.9	51.1
March	52.6	45.2	75.3	53.2
April	55.8	47.7	83.4	57.1
May	65.6	54.3	91.3	61.9
June	69.3	59.5	98.4	65.6
July	75.6	60.7	100.1	70.7
August	78.8	70.2	100.4	72.6
September	70.1	60.0	94.0	67.7
October	63.0	56.1	82.9	63.0
November	51.3	44.3	66.2	51.8
December	45.4	37.0	59.8	44.6

From 1876 to 1892, inclusive, the monthly mean temperature was 73°, the mean maximum 86°, and the mean minimum 59°. The highest temperature noted was 118°, and the lowest 25°. The largest number of days in any one year in which it was below 32° was 6. During this time the mean relative humidity was 44%. In 1892 the monthly mean temperature was 72°, the maximum mean 87°, the minimum

mean 58°, highest 116°, lowest 28°, and the mean relative humidity 40%. (From official records, Yuma, Arizona.)

A dry atmosphere favors evaporation, and thus keeps the body temperature down, causing the heat of the desert to be easily borne. A temperature of 115° here is less depressing than 90° in New York, nor is it so liable to cause sunstroke. This calamity is unknown here.

The altitude being low the atmosphere contains more oxygen, therefore more is taken into the lungs with each inspiration than is possible in elevated regions. At sea-level 1 cubic foot of dry air at 32° contains 130.4 grains of oxygen, but at an elevation of 5,000 feet the same quantity of dry air, at the same temperature, contains only 108.6 grains.

Clear, sunshiny days are almost the constant rule. The average number of rainy days (those in which the rainfall is .01 of an inch or more) will not exceed 5, and in these the sun shines part of the day, and the showers are so light that they need not be excluded. At Yuma, in 1892, the rainy days were 16, clear days 302, partly clear (including the 16 rainy days) 58, cloudy days 6.

The Colorado Desert, then, is a region in which an individual may live almost wholly, day and night, out of doors. "The Arab, accustomed to the free air of the desert, is said to be afraid of even the outskirts of the town. Many other persons there are, besides Arabs, whose sense of smell is sufficiently acute to detect the odor of great cities at a considerable distance. Yet there are multitudes of people in some of the most salubrious climates in the world, naturally, who fail to appreciate the difference between the stifling air of a badly constructed house and the Arab's tent, until they experience the results, or to recognize the fact that no climate is proof against the sickening emanations of a filthy soil, city or country." (Bell.)

The best climates for invalids are perhaps not the equable ones (though this is desirable), but those which present the greatest number of hours to be passed out of doors. Trudeau advises patients to be out of doors all the time in spite of weather, well protected, of course.

The researches of Koch have fully demonstrated the fact that tuberculosis is caused by a microbe, the tubercle *bacillus*. This microbe is a moisture-loving creature, and is quickly destroyed by sunlight and a dry atmosphere. It rapidly succumbs when exposed to the sunlight of the desert.

To make any climate available to invalids there must be facilities for getting there, and accommodations for them when they arrive. On this desert the only place meeting these requirements, at present, is Indio. This station is on the Southern Pacific Railroad (Sunset route), 130 miles east from Los Angeles, 20 feet below sea-level. It is in the midst of the desert, but has been so improved by the Southern Pacific Company, by sinking artesian wells and growing trees and shrubbery, that it has become a veritable "oasis in the desert," and a very lovely and charming spot. There are large trees—palms, cottonwood, poplar, fig, etc. The palm, so extensively used throughout California as an ornamental tree, is a native of this desert, and there grows to a very large size.

There are at Indio a post office, telegraph office, and a good hotel under the excellent management of Mrs. L. Marshall and a good corps of assistants. The hotel is comfortable, well furnished, heated with hot water, well supplied with sanitary plumbing, and the table is all that could be

desired. The main building has room for a dozen or more guests, and there are nine cottages connected with it, which will accommodate about thirty. There are bath-rooms and closets in the main building and all the cottages, with hot and cold water. The water is the very best, coming from artesian wells 600 feet deep, and is soft, showing no alkali in washing. The daily overland trains, both ways, stop here for meals.

Indio is already a well-known resort for invalids, and is an excellent foundation for a good sanitarium, if placed under the sanitary care of a competent physician, preferably one who is well informed as to the possibilities of the climate, and, by all means, one who understands the sanitary requirements of such an institution. It is a great mistake for a patient to imagine that, as he is in search of climate, he needs nothing else. "Invalids must not imagine that they are qualified to care for themselves, and that air alone will cure them. They must go under competent medical advice, so that every detail of clothing, food, exercise—in short, of daily life—shall be adjusted to place and time, to internal and external conditions." (Solis-Cohen.) Several physicians, with whom I have talked, have told me that they have frequently had patients they wished to send to Indio, but have hesitated because no physician was located there.

Consumption is not the only disease that would be benefited by the climate of the desert. The great majority of all cases of rheumatism, asthma, and nervous prostration will be relieved. I can personally testify that a person suffering with insomnia from overwork, or nervous prostration, will improve greatly at Indio, and such cases will be benefited by spending the hot season there.

Some cases should *not* be sent there, or any place away from home: (1) Cases that have progressed so far that the end is a question of a few weeks or months. *Hospital* cases should not go to a sanitarium. Home, with home comforts and friends, is the proper place for such. (2) The very "poor and respectable." The worry about finances counteracts the good effects of climate. (3) Timid people, unaccustomed to caring for themselves.

At Salton, 25 miles east of Indio, patients can find a salt atmosphere, with a further depression below sea-level—263 feet. Mr. Durbrow, Manager of the New Liverpool Salt Works there, tells me he has seen asthmatics and consumptives entirely relieved by a residence at that place.

If patients should desire a change for a few days, and such change is not contraindicated, a trip to Banning could be made, 43 miles west, at an elevation of 2,300 feet. Dr. John C. King, who has lived there eight or ten years, speaks very highly of the place. The late Mr. Munson waxed "exceeding eloquent" over the atmosphere of the San Gorgonio Pass. "Once upon a time" he wrote: "There is prevailing in this pass at this time a spell of weather that must tempt angels to leave the asphodel-starred shores of their high abode. The sunshine is as warm and comforting as a mother's love; the shade as refreshing as a summer shower. Through the day there sweeps by the breath of the desert, smooth and furred like a seal's skin. At night faint stirrings of the medicinal ether that serves us for an atmosphere suggest the whir of spirit wings and the voices of angel visitants. The hills approach in their distinctness, and like devotees in the confessional lay bare their every fault. The dark line of the hill crests against the sky as distinct

as penciling on ivory. From matin bell to matin bell every hour is a sweet legacy, and sleep is a robber who despoils us of so many hours of glory."

THE PRESIDENT: Will Dr. Cole please approach this end of the hall? Gentlemen of the Convention, it affords me much pleasure to present my distinguished friend, R. Beverly Cole, President of the American Medical Association.

DR. COLE: For many years, Mr. President and gentlemen of the convention, through my readings I have been taught to believe that if there was one quality of character that distinguished the residents of this, the southern citrus belt, it was that of kindness of feeling, hospitality, and generosity.

I regret that I am disappointed in the announcement which you have made in calling me here. I had supposed that you were so generous that you would scarcely expect me to address your convention. I am here in the humble capacity of a private citizen at this time; true, a member of this great and glorious profession, than which I love nothing in life more, and all that relates, appertains, and contributes to it. Is there anything that contributes so largely as that particular branch in which you gentlemen are now assiduously engaged—preventive medicine? Yet I would gladly have escaped making these remarks. They are not prepared, but if they had been, likely they would have been less acceptable, for as it is I speak from my heart and not entirely from my brain, when I say that this is the most important of all appertaining to medicine—the prevention of disease.

For twelve or more years, sir, I had the distinguished honor of being a member of the State Board of Health, in which time I dedicated much of that which could have been perhaps more profitable to me to the cause in which we were engaged, and to which our time justly was dedicated.

Much has been accomplished, sir, through preventive medicine, but there yet remains much more than has been accomplished; and while I can see the advances that are being made both in this and other States of the Union, so do I at the same time see many directions in which advances should be made. But this is neither time nor place—I was not expected, nor was I expecting myself to address you, and hence I think I had better not permit myself to open my heart fully upon this whole theme. It would occupy the entire afternoon, aye, it might be all of your coming evening and the day following, which would be both inconvenient for you who are here to attend the State Medical Society, and very tedious and uninteresting. I only say, therefore, that I am appreciative of the compliment intended in presenting me to your convention, and, thanking you for the patience with which you have listened to my few words, I make my bow. [Applause.]

THE PRESIDENT: This completes the program for the afternoon session, unless there are some volunteer papers which could be presented properly at this time, as we have at least a half-dozen very interesting papers for this evening, at which time we expect a large attendance. Dr. Nutting informs me that there is a most interesting volunteer paper presented by Dr. S. S. Herrick, of San Francisco. The title of it I do not remember.

DR. RUGGLES: I have the paper by Dr. Herrick. I now make a motion that this paper be read by title and referred to the Committee on Publication.

Carried.

DR. RUGGLES: Here is a paper by Mr. Oates, architect, formerly Plumbing Inspector of the City of Stockton, whose ability I fully recognize, he having served, as it were, under my supervision for two years, and therefore I move that this paper be read by title and referred to the Committee on Publication. It is a paper on "Ventilation of Public Buildings."

THE VENTILATION OF PUBLIC BUILDINGS.

By W. W. OATES, Architect, of Stockton, Cal.

Ventilation is defined by Webster as "the art or process of replacing foul air by that which is pure, in any inclosure, such as a house." Ventilation as applied to public buildings, schools, etc., carries with it, to a very great extent, the subject of heating, as each depends on the conditions of the other for satisfactory results; so that, putting it practically, it is the introduction of pure air (generally warmed) and the expulsion of the foul air, whether cold or heated. It is understood that the air of rooms, to be kept comparatively pure, must be changed constantly, the object being to prevent the certain effects caused by breathing vitiated air, such as listlessness, drowsiness, and often what *teachers* define as punishable restlessness. The restlessness in children so annoying to teachers might be traced, in many cases, to lack of pure air and a superabundance of that material known as carbon dioxid. This compound of carbon and oxygen is not of itself poisonous, but, according to Professor Brown-Sequard, the eminent physiologist, "there is associated with it, when furnished by animal respiration, one of the most powerful poisons known, exceedingly small quantities being sufficient to produce death." Careful experiments by English authorities show that with each breath a person throws off into the air one cubic inch of carbon dioxid. As air naturally contains from one and one half to two cubic inches of carbon dioxid in every five thousand cubic inches of air, this amount, plus the additional one cubic inch of carbon dioxid in the air exhaled by each person, or two and one half cubic inches in five thousand cubic inches of air, establishes, therefore, the standard of safety. Each person, then, renders unfit for further use five thousand cubic inches, or about three cubic feet, of air per respiration, which would equal fifty-four cubic feet per minute for each person breathing at an average of eighteen times per minute. At this rate, each person will require three thousand two hundred and forty cubic feet per hour; but, states Dr. Kellogg, "other authorities place the line of dangerous contamination at a somewhat higher point, and consequently require a smaller amount of air." This same authority places an average on the figures of the many who stand high in the science of domestic engineering, and finds, by actual test and experience, which was gained by the installing of large plants under his own charge, that two thousand four hundred cubic feet per hour is sufficient for each person in buildings other than hospitals, provided that other conditions necessary are given due consideration, one of which is to know definitely

the number of persons to occupy a given space, which given number should be the maximum rather than the minimum number, for the obvious reason that ventilating ducts may be readily reduced but not easily enlarged. It is claimed by some that the air-supply of a room should be computed by its size, without reference to the number of its occupants. This is certainly not correct, as a small room will demand a greater air-supply than a large room occupied by a like number of persons. Having determined on the amount of air per hour necessary for each person, the following subjects (five in number) are to be considered to secure effectual ventilation, according to Drs. Kellogg, Bixby, Wolpert, Parke, and many others, with whose theories and practical experiences we have become acquainted by review of their writings on the subject, and by correspondence:

1. *Proper arrangements for the constant movement of the air in rooms* consist in two openings—one for the admission of fresh air, whether it be warmed or not, and one for the exit of foul air. Attempts are frequently made to ventilate and heat buildings with only the one provision of the fresh-air inlet, or *vice versa*, but oftener the former, and the writer has in mind a church, into which fresh air is expected to be received from the outside without an outlet, except such as windows and doors. Nothing is more absurd than this; indeed, if it were not for the joints and crevices around windows and doors, and the occasional opening of the doors and windows themselves, it would be found impossible to warm and ventilate, in any degree, this building. The result is far from satisfactory as it is, either in point of heating or ventilation. The introduction of warm air without proper outlets (in the church referred to) causes pressure, gradually increasing until the point of endurance is reached; and when a window or door is finally opened for relief, a rush of air is caused, which is not conducive to good health.

2. *The area of fresh-air inlets.* Inlets are figured for their capacity, according to the sum total of the air required and the velocity at which the same is to travel. It is stated that air heated 40° above that on the outside will move at the rate of five feet per second, but when aided by an aspiring shaft or chimney the velocity may be placed at ten feet per second, and greater as the temperature of the incoming air is increased, or rather raised; ten feet, however, is accepted generally by competent authorities as a proper velocity for the incoming air. We will then divide the total amount of air required per second by ten, and the result will be the sum equal to the sectional area of the duct, in square feet; to which should be added from one third to one half, according to design, for register facings, which are necessary, but nevertheless obstructions if not allowed for.

3. *The size of ducts for the expulsion of foul air.* These should not be over one half that of the inlets, for the prevention of unpleasant draughts; that is, the velocity should be reduced to five feet per second. The area of the outlets is arrived at, then, by dividing the total amount of air required per second by five; thus, if ventilation is estimated for fifty persons, each to be allowed two thousand four hundred cubic feet per hour, the problem will be $50 \times 2,400$, or 120,000 cubic feet. Reducing this to seconds by dividing by 3,600, the number of seconds in an hour, we have 33.3 cubic feet required for each second. This we divide by five for the velocity desired, and we have 6.6, which represents the area of the outlets in square feet, and plus the one third for register facings, equals 8.8 square feet.

4. *The location of fresh-air inlets and foul-air outlets.* This is a question upon which there is a difference of opinion, principally, however, concerning the foul-air outlets. Nearly all authorities agree that the location of the fresh-air inlets should be in or near an inner wall, and that it is a matter of no great moment whether it be admitted high up or low down: the result will be the same, because the heated air, being of a higher temperature and lighter than that of the room, rises at once to the ceiling, little or no diffusion taking place until that point is reached. The location of the outlets, however, is a matter of greater consideration. Complete movement, and consequent change of *all* the air of an apartment, will depend almost wholly on the location of the outlets. As before stated, the current is direct to the ceiling from the point of entrance. The ceiling being a level plane, its area is traversed until contact is made with the inclosing walls, which at once turn the current downward to find an outlet. It follows, then, that the nearest outlet to the incoming air register, if in the course of the current, will be the *natural outlet*. If perchance a large register or opening were located immediately above the inlet, then this register will become the outlet; if, again, an opening happens at a point in the ceiling at the opposite side of the room, or in the floor below it, it will become an outlet. Yes, you will say; but what will become of all that undisturbed air space between such outlets and the point of entrance of the fresh air? The question suggests to us a conclusion, that the location of the outlet is yet the whole width or length, as the case might be, away from the proper point of where its use will influence the most air space of the apartment. It has been stated by what seems good authority, that outlets should be in the outer wall, opposite that of the inlet, urging that if outlets are placed near where the fresh air enters, the warm air will fall to the outer walls, become cooled, and cause cold feet, attended with numerous bad effects. We say *emphatically* that no such results can be had with ample heating capacity and properly proportioned inlets and outlets; and doubtless if any such case did exist, it would be found, on measuring the ducts, that the outlets were too large in proportion to the inlets, or that it was a case of inadequate heating capacity, which is too often the case. We are constrained to believe that with ample heating capacity, the warm air will not be cooled more than 2° or 3° by the outer walls, which will not be appreciable at a velocity of five feet per second; at least no ill effects could be caused by so gradual a movement of the air. Better results will be obtained by the architect so laying off his plans that the current circuit may be parallel to, rather than at right angles with, the principal window wall.

5. *Ventilation*, or the constant current of air entering and in turn passing out, is secured by two methods—one by an aspiring shaft or chimney-like stack, and the other by means of a fan exhaust or power blower. Aspiring stacks are designed to exhaust the air from the rooms, creating a partial vacuum for the incoming fresh air. The air current of the aspiring stack is caused by heating, first, by means of the smoke flue of the furnace heater, so constructed as to pass up through the stack for winter seasons; and, second, by properly constructed stoves, called stack-heaters, placed at a point just above where the foul-air ducts enter the stack, for operation during the summer months and other times when the heating furnace is not in use. Coke has been found to be the best fuel for use in heating stacks and producing up-currents or draughts

because of the small amount of attention necessary to keep it going, and will not be subject to failure, as some mechanical devices are, such as fans, water-supplies for boilers, etc. Mr. Sugg, in a paper accurately describing the ventilation plant of the House of Parliament, England, in all its details, writes: "The utilization of the powerful shaft in the clock-tower to produce an upcast sufficient for the extraction of the products of combustion and vitiated air from all the rooms, offices, and chambers of the House of Commons, has been very simply and scientifically arranged. A large iron grille, rather less in area than that of the shaft itself, is fixed at about four feet from the ground, so as to allow of sufficient air passing under it to keep a layer of coke freely burning on it. The size of the coke fire regulates the velocity of the upcast. The heat of the burning coke produces an upcast more or less rapid as the fire is increased or diminished, or as the external atmospheric influences affect the draught either one way or the other. In cold weather the draught, with the same amount of fire, is better than it is in hot weather. This is easily remedied by slightly increasing the fire in summer. By this extremely simple method the whole of the heating power of the coke is converted into force. The saving of labor in looking after the fire, as compared with what it would cost supposing steam, electricity, or other motive power were used in combination with a fan or other contrivance, is enough to render this method the cheapest and best way of putting so large a body of air at so low a velocity into motion, with the help of the shaft." While it may be admitted that fans or other mechanical devices are necessary in certain cases, and must be used to that extent, the general verdict of those who give the subject most attention (outside of those of mercenary intent) is unfavorable to the general use of blowers and exhaust fans. Our own observation confirms this. The new City Hall of San Francisco was constructed embodying certain theories of ventilation calling for forced air currents by the aid of power blowers, and we were informed by one of the Health Department that the plant had never been in operation, and the reason assigned was, cost of maintenance. In Stockton an example is found in the new Court-house, the pride of all Stocktonians. This building (on its plans) was provided with a system of ventilation, but in its construction it was decided by the building committee (the powers that be) to omit certain of the features contemplated in the system. The building committee, being composed chiefly of gentlemen who had paid more attention to tilling the soil than to the theories and practice of domestic engineering, concluded that a fan to "pull" the air out of the building was indulging in luxuries quite beyond a point they considered their constituents would stand without the regulation "kick," so the fan feature met with disapproval. The state of affairs caused by this serious omission does not end, in this case, in simply depriving the various apartments of this beautiful building of efficient ventilation, but adds to all the evil effects of vitiated air, by turning ducts intended for outlets of foul air into inlets for the admission of sewer air. This foul air was designed to be drawn downward by the exhaust-fan, but by its inoperation such air is carried by the ducts into the other apartments, until a large portion of the building is affected by the poisonous and nauseous air.

Dr. Kellogg, in writing of this subject and of fans, states: "I have visited many large institutions provided with large ventilating fans, and have not yet found one in which the apparatus was in constant opera-

tion. In many places it had been inoperative for years, and was not in running order. In one case I was informed that the fan was started 'whenever the odors in the ward became so strong as to be noticeable.' To my nose the odors were at that very moment pronounced, and yet the fan was not in operation. The noses of managers and attendants become accustomed to odors, to the presence of which they are constantly exposed, so that they cease to be a proper means of testing the condition of the air."

Our conclusions, then, in respect to the practical use of fans, must form the basis of a verdict emphatically against them, or rather their *pretended* use. What can be more ridiculous than the expenditure of large sums of money for appliances to effect ventilation, and then settle down in contentment and false security, awaiting satisfactory results, without the operation of the plant.

It was stated in the beginning that to keep the air of rooms comparatively pure, the air must be changed constantly. The question some janitor, or perchance a school teacher, may ask is, how are we to know that the air is being changed, and whether it be at a proper state of humidity, etc.? This leads us to another phase of the question, which demands attention and furnishes ample food for thought. We have dealt with the installation of the mechanical and practical details of the plant, but however well this may be figured out, much yet remains to effect the desired result. Air is affected in a more or less degree by its relative dampness. The general opinion, unsupported by tests, or other means than casual observation, is that air is injured by heating, and consequently the heated, dry air is detrimental to respiration. This is not correct, unless extremes are allowed to be set up as proof. According to Bixby, Wolpert, Sugg, and other experts who have made extensive researches and practical tests with the hygrometer, it is not injurious to inhale reasonably *hot*, dry air. On the other hand, it is found that high percentages of humidity or dampness cause the very identical effects claimed to be caused by dry heat. While the extreme in either case may cause similar effects, it does not follow that a reasonably dry condition of air is injurious or even undesirable. Very certain it is that the higher the degree of heat and percentage of dampness in a room, the more heat is conveyed to the occupants, and beyond the reasonable or average point will come ill effects; therefore, it will be seen that a "happy medium" should be maintained; that is, each extreme should be avoided by the installation of a plant of ample capacity, with provisions for an even degree of heat and humidity; also, each room should be provided with an air-tester, combining a thermometer to show the temperature, a barometer to indicate the density, a hygrometer to measure its moisture, and an anemometer to test or determine the velocity of the air currents. A knowledge of the exact condition of the air in school-rooms, as to all of these conditions or elements, is essential, and absolutely necessary to expect anything like perfect results and assure comfort and health to the occupants.

The air-tester: Although somewhat new and not generally understood, the one devised by Professor Wolpert is not complicated and may be easily made. An air-tester should be used for one particular reason: Perfect ventilation, after all the ducts, inlets, outlets, and other devices necessary to the system have been provided, can only be attained by strict dependence on some device or reliable means of determining the

quality of the air other than by mere observation, as you would by the thermometer in the sick-room. The teacher in a school-room, not being proof against the ailments of the body, may feel oppressed and mistake his or her condition for faulty ventilation, and cause windows, etc., to be opened; but if provided with an air-tester, the teacher need but to examine to determine wherein the trouble lies. It will be well to state, in connection with this subject, that open windows are a positive detriment to the successful operation of ventilation systems having aspiring stacks, owing to violent draughts, the effect being the same as in cases where the areas of the inlets were made too large in proportion or without regard to the areas of the outlets, as before stated, causing increased currents of air, which become in the nature of draughts.

DR. RUGGLES: If there be time and any one is willing to read Dr. Herrick's paper, I wish that it could be read, for the reason that the State Board of Health is struggling, so to speak, with the question of contamination of drinking waters. I will state that among the proceedings of the State Board of Health at its previous meeting has been the subject, discussed frequently and very effectually, I think, in relation to the contamination of the drinking waters coming into the Sacramento River. It is a fact that the Board has visited the State Prison at Folsom, twenty-two miles from Sacramento. There are nine hundred convicts there. Their fecal matter is turned directly into the American River, undiluted, and everything in perfect shape, and goes down the American River to the citizens of Sacramento. When the question was presented to the directors of that institution in regard to the impropriety of such action, they immediately said, "Why isolate us; why pick us out and not pay any attention to those on higher portions of the river?" meaning Red Bluff, Marysville, Chico, Colusa, and some other points. The argument was irresistible. Therefore, a committee was appointed by the Board to visit those cities, and at the same time to see as to the amount of contamination of the Sacramento River. That committee will report to the State Board of Health at its next meeting. This paper by Dr. Herrick appertains, as I understand, to that very question: in what way is the drinking waters of our rivers contaminated by sewage. Therefore, I hope, if there is some gentleman here with a good voice, that he will read that paper.

(Paper read by the Secretary.)

THE POLLUTION OF POTABLE WATERS—ITS PROPER REMEDY IN CALIFORNIA.

By S. S. HERRICK, M.D., of San Francisco, Cal.

It is unnecessary, in this presence, to adduce arguments in proof of the sanitary necessity of pure water for drinking and cooking purposes. On the present occasion I shall not consider objectionable constituents of a mineral character belonging to natural waters, but only those organic impurities admitted through neglect of plain and practicable hygienic precautions.

Liability to contamination increases directly with density of population, and measures of prevention ————— are for a time unnecessary

become afterward imperative. These, however, can not be left to the voluntary action of separate individuals, but must be made binding by Penal Acts reaching the whole population. The time has not fully come, but is fast approaching, when the defilement of streams in California will seriously affect the public health, and it is well to consider, in advance, appropriate means of prevention.

The proper disposal of town sewage is the most important and difficult problem in this connection, and before long the public welfare will require its total exclusion from streams and from lands contiguous to the same, or to springs and wells. This does not particularly concern San Francisco and the other cities and towns adjacent to tidal waters, but the growing towns of the interior must soon face it. Fortunately for California in this regard, its conditions of rainfall give value to water for irrigation, and, still more fortunately, town sewage has greater worth for this purpose than pure water. Details of method is the proper work of the hydraulic engineer. It is true that the financial results of sewage-farming have not been flattering in Europe and in the Eastern States of our Union, where rains are perennial, but in California irrigation is almost everywhere beneficial, and sewage is worth more than clear water.

In this respect, as well as in the disposal of solid refuse by cremation, Los Angeles has set an example worthy of imitation. I am indebted to Dr. H. S. Orme, a long resident of that city, and former member of the State Board of Health, for the following particulars:

1. The greater part of the sewage of Los Angeles is now used for irrigation.

2. The works are public, except those belonging to the South Side Irrigation Company, which sells water to those requiring irrigation.

3. The lands irrigated are private property. On the line of the great outfall sewer to the ocean, owners pay at the rate of \$3 for twelve hours' run of the sewage.

4. This plan is successful in an economic sense, because the city derives some revenue from what would otherwise go to waste, since irrigation is necessary and customary on those lands.

At Pasadena sewage-irrigation has been successfully practiced for three years, under management of the City Council. A farm of 300 acres is owned by the city, half of which has been used in this way. The soil is a loose gravelly loam, most of it having been impoverished by repeated cropping. In two seasons the crops were increased enough by this irrigation to pay all expenses. All the sewage of Pasadena and part of that of Alhambra is applied to this tract—that is to say, the excreta and liquid waste of five thousand people to one hundred and fifty acres. At first some complaints were made, and a restraining suit was brought by a non-resident land-owner; but now all the owners of contiguous lands are desirous of obtaining the sewage. It has been found, both here and elsewhere, that apprehensions of disagreeable odors and sickness are groundless, with good management. Of course, intelligent supervision is necessary, to prevent excessive application of sewage at one time. Enough land must be available, so that different portions may be successively treated. The greatest difficulty is encountered during the rainy season, when more rapid rotation is needed.

I am informed that the sewage of the asylums at Stockton and Napa is applied to their own lands. Although the sewage of San Francisco

now takes the shortest and easiest flow into the bay, it is practicable to divert most of the outfalls, so as to apply it to many of the hundreds of vegetable gardens which are now dependent on wells and windmills for needed water; and it is probable that the city might derive a fair return on the increased expense of its sewer system suitably modified to meet this object. As sewage always carries in suspension a varying amount of solid matters: these deposited in proximity to the wharves must in time produce shoaling of the water and lead to expense for dredging; to say nothing of unpleasant fouling near the outfall of sewers close to ships moored to wharves.

But it cannot be expected that the general disposal of town sewage will be compatible with good hygiene, in the absence of special legislation. It is true that the Penal Code contains a provision which, to the non-legal mind, might be presumed to cover the ground; for Section 370, adopted 1874, reads as follows: "Anything which is injurious to health, or is indecent or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property by an entire community or neighborhood, or by any considerable number of persons, or unlawfully obstructs the free passage or use, in the customary manner, of any navigable lake, or river, bay, stream, canal, or basin, or any public park, square, street, or highway, is a public nuisance."

Section 372 reads: "Every person who maintains or commits any public nuisance, the punishment for which is not otherwise prescribed, or who willfully omits to perform any legal duty relating to the removal of a public nuisance, is guilty of a misdemeanor."

In 1876, Section 374 was adopted, having reference to the pollution of streams, lakes, and reservoirs supplying water for domestic purposes, by the carcasses or offal of dead animals, or by live animals kept on lands contiguous to such sources of water-supply. It is presumable that Section 374 was adopted because Section 370 was found defective, in failing to specify forbidden acts; and on the same ground it may be supposed that courts would not construe Section 370 to apply to the fouling of waters by sewage. Judicial acts are governed by precedent, and, so far as I know, there is no judicial condemnation of sewage pollution in California. The complaint is a new one here, though not so in England and the more populous Eastern States of our Union; and it may be presumed that our courts would decide as did the country innkeeper when one of his guests complained of the common roller-towel: "My friend, the towel is all right; a hundred persons, as good as you, have used it without finding fault."

It is only within a few years since Section 374 was effectually applied, so as to prevent the free range of cattle and hogs upon the lands adjacent to Lake Merced, which supplies the Spring Valley Water Works of San Francisco. The Act remained a dead letter for nearly fifteen years.

Probably the most flagrant pollution of potable waters in California is the discharge of the sewage of Folsom, including its thousand convicted felons, into the American River, twenty miles above Sacramento. Our legislators take their cold infusion of the Folsom Prison for sixty days biennially, without wry faces, and remain fixed in the belief that it is good medicine for the Sacramento people the whole year round.

The remedy is a new Act, specifically forbidding, under appropriate penalties, the contamination of water-supplies by human excreta,

whether by individuals or communities; also giving any aggrieved party action for damages actually sustained through sickness, and relief by injunction against acts liable to result in water defilement. It is to be noted that the Penal Code of California, relating to nuisances, has hitherto applied to persons rather than to communities, and it is not to be expected, therefore, that our courts would hold municipalities or corporations amenable to these acts, in the absence of precedents; yet the following quotations from text-books of acknowledged authority seem to me applicable:

"There is no principle which allows a city to conduct into a stream, by means of sewers, the water and filth which comes from a dense population." (Lewis on Eminent Domain.)

"A municipality has no more right at common law to pollute streams with sewage than a private person, and its duty to prevent public nuisances by taking care of the sewage gives it no right to create another nuisance by the pollution of a stream." (Angell on Water-courses.)

"Even if sewage has been discharged into a stream for several years, but in quantities not producing perceptible injury, it confers no right to afterwards increase it, so as to cause serious injury." (Wood on Water-courses.)

"Cities are not entitled to foul the rivers with the contents of water-closets and convert a stream into a stinking sewer." (Addison on Torts.)

The following is from an Act of the Ohio Legislature, adopted in 1893: "No city, village, corporation, or person shall introduce a public water-supply or system of sewerage, or change or extend any public water-supply or outlet of any system of sewerage now in use, unless the proposed source of such water-supply, or outlet of such sewerage system, shall have been submitted to, and received the approval of, the State Board of Health." It has been found of great service in that State, and the same, or its equivalent, would be equally useful in California.

I venture to express the hope that this subject will be brought before our next Legislature, and that our State Board of Health may be active in promoting some measure of reform.

DR. GEO. A. WHITE, of Sacramento: I am sorry to say that I did not give the paper the attention that its importance demands. The fact that the subject of pollution of water-supply is particularly placed in the American River makes it a matter of interest to all Sacramentans. The Folsom Prison is situated some twenty miles above Sacramento, and, as the writer states, the sewage from that institution is carried direct to the American River. The pollution of the drinking water from the river, of course, will, in time, necessarily follow. Up to this time, I believe, the statistics of the City Board of Health do not show an increased amount of disease, such as would be expected from that contamination. We are, however, awaiting with fear and trembling that the statistics in the future will develop an alarming condition of affairs, and we are praying that a law will be passed to forbid the State from contaminating public streams. The cities above Sacramento, as Dr. Ruggles states, also empty into the river, and also add their filth to the water which we drink. The law is lamentably defective in permitting that condition of affairs. What will be done in the future will rest largely, I presume, with the State Board of Health. We hope that they will take active measures to bring the subject before the Legisla-

ture in such a forcible way that that body will be compelled to act. I am very much pleased with my visit to this convention, and with the papers read in it.

THE PRESIDENT: The question has been raised whether we shall read the minutes thus far, or wait until the end of the convention, as the minutes will be approved by the convention. What is your pleasure?

DR. WHITE: I move that the reading of the minutes be dispensed with until the business of the convention is over.

Carried.

THE PRESIDENT: I will state that circumstances, as you know, have interfered largely with the attendance to-day. Physicians coming from a distance are met by friends, and are scattered hither and thither, and the physicians of the city are at their offices, as they are usually when a convention meets in their own city. We will have a good attendance this evening, and a good program, and we contemplate calling the convention early, as the program indicates, at half-past six o'clock.

Adjournment was here had until 6:30 P. M.

EVENING SESSION.

HOUSE VENTILATION.

By D. B. VAN SLYCK, M.D., of Pasadena, Cal.

If to heal the sick, to relieve pain and suffering, entitle medicine to be considered the noblest of callings, though success in its practice generally brings more or less applause, a fair pecuniary reward, and (exceptionally) wealth, what meed of praise shall be accorded the man who devotes his time and energies to the *prevention* of disease and to teaching the people how not to get sick, which is the distinctive function of sanitary science?

The medical profession has proved its unselfish devotion to humanity by being the pioneers and chief workers in this cause. We can proudly point to well-fought fields and battles won, but still the war on dirt and uncleanness is only just begun.

We have only carried the outposts. Visible filth, and the stench from decaying animal and vegetable matter, appeal forcibly to the senses as unsanitary, and the importance of clean streets, good sewerage, proper house drainage and plumbing are now pretty well understood, and the best modes of effecting these fairly well carried out.

It is to invisible filth in the air we breath inside our houses that I desire to call your attention—a subject which has had scant consideration in the past, and is still woefully neglected in practice by architects and builders, whose business it is to give us clean, healthy houses and public buildings that are not a menace to health.

We demand pure water and clean food, and are satisfied if these seem so to the eye. Our stomachs revolt at a hair in our butter, or a speck of dirt or an insect in a dish set before us at dinner. Nothing would induce us to drink a glass of what 'dirty water, and the very

thought of human excrement induces nausea; yet we sit unconcerned in a crowded, unventilated room where every breath of each occupant exhales the poison of carbonic acid gas, and, more pernicious still, the other products of the combustion going on in the system and thrown off by the lungs, as well as the noxious exhalations from the surface of our bodies. We are oblivious of the fact that the skin is a great secreting organ, and is pouring the waste of tissue in invisible particles into the atmosphere every moment, and that this is just as much excrement, just as nasty, and just as poisonous as the excretions of any other organs—as the liver, kidneys, or bowels.

Indeed, the skin often supplements other organs, and sometimes saves from death by its vicarious action. If the liver should cease to act, bile is thrown out through the skin, and the whole surface of the body becomes yellow. If the urine be suppressed, the odor of it, after a time, becomes very apparent in the air about the patient.

If the bowels are constipated for several days, a distinct fecal odor pervades the sick-room.

The presence of a laborer who perspires much, wears the same clothes all the time, and seldom bathes, will soon make the air of a large room intolerable. How much more offensive will be an assembly room occupied largely by uncleanly persons? We can all recall the peculiar odor of unventilated school-rooms, that airing through a whole vacation and thorough cleaning cannot make sweet; also, the sickening stench of dirty bedclothes in the tenements of the poor and slovenly. This is the odor of accumulated excrement. All such matter is more or less poisonous, and can only be guarded against by personal cleanliness and good ventilation.

If you should wash some of the air of an unventilated, crowded room, by passing it through a small quantity of water, you would be astonished at the amount of filth that would become visible. Your stomach would revolt at the sight, yet you breathe the filthy air that held it into your delicate lungs, where the poison is absorbed into the blood from the immense surface of the air cells, and think nothing of it. Bad ventilation poisons in this way, and also by the lessened amount of oxygen available for respiration, and, in consequence, the metabolism of tissue-waste is less perfectly performed, excretion is hindered, impurities are retained in the blood, assimilation suffers, and not only is disease thus directly produced, but also the general vitality and vigor are lowered, and a fruitful soil offered for the propagation of pathogenic germs, especially that of the tubercle bacillus.

It is my firm belief that in as many as three fourths of the cases of consumption, the predisposing cause of the disease is bad ventilation.

In cold climates, it is by no means the low temperature, nor even the sudden and extreme variations of temperature, that make tuberculosis so prevalent, but the fact that a large portion of the population is, for near six months of the year, housed in furnace-heated and unventilated rooms—the women of the better classes at home, and working-women in shops and factories, while the offices and places of business of the men have not even the pretense of ventilation.

The successful treatment of phthisis at Davos in Switzerland, and in the Adirondacks in this country, by compelling patients to spend the greater part of each day in the open air, even at zero temperature, proves

that it is life in the open air that cures, and that cold is not in itself an unfavorable condition.

The inference is a reasonable one: that the well would not get sick of this disease if their mode of life were ordered in the same manner.

It is well known that cavalry soldiers in active service seldom get sick, and that primitive races of men, and especially nomadic tribes, are almost exempt from tuberculosis.

The same thing may be said of the whole rural population of this country in early days, before the invention and introduction of stoves. The broad fireplaces and immense chimney flues made the air as pure indoors as that outside the houses. So that their whole lives were practically spent in the open air.

The records of old-world prisons show that the death-rate from consumption used to be something frightful.

The introduction, about 1840, of systematic ventilation in the Vienna prisons, though of a very imperfect sort, soon reduced the rate over eighty per cent. About the same time good ventilation was provided for the barracks of the British army, and the death-rate from consumption straightway fell from nine in a thousand per annum to only two and a half. Proofs like these, of the efficacy of pure air in the prevention of disease, might, were it necessary, be multiplied indefinitely. As a general abstract proposition, everybody admits its importance, but in the concrete everybody, in practice, ignores it.

Could we all, like our pioneer forefathers, spend our days in active labor in the open air and our nights in as well-ventilated houses as theirs, there could be nothing better, in a sanitary sense, to be desired; but the exigencies of modern civilization require more than half our population to live in towns, and to spend the most of each day, as well as their nights, in houses. No other sanitary problem, therefore, can possibly exceed in importance that of keeping the air in our houses and places of public resort as pure as that outside.

Science has solved this problem, as I shall prove later on, and it is only a question of willingness and money for the public to realize its great benefits.

The ordinary idea of ventilation is to admit more or less outside air through door or window, to somewhat dilute the vitiated air inside; and even this much is made subordinate to warmth.

If the temperature of the room be below 70°, everything is shut tight, however close and malodorous the air may be, until the occupants are too warm; then a door or window is thrown open, and the unlucky victim of the draught is pretty sure to catch cold. Indeed, living in foul air predisposes to catarrh and respiratory troubles on very slight exposure.

This is the prevailing mode of ventilating cottage and mansion, boarding-house and grand hotel, churches, schools, public halls, and theaters.

In California houses are scantily provided with chimneys—even many of the better sort—so that more or less rooms in most of the houses—even some large and fashionable boarding-houses—are warmed by all sorts of makeshifts; gas stoves and the deadly lamp and oil stoves add the products of combustion to the already polluted air. And still this is the Mecca of consumptives! They come thousands of miles, at great expense and trouble, to be poisoned in this land of sunshine, and be embalmed and shipped back by the undertaker!

What a different showing would we have for this glorious climate could these poor victims of disease be made to live in the open air by day; enjoy proper sanitary conditions in their houses, and also have a suitable dietary enforced by an intelligent physician.

But enough has been said on this branch of our subject. I have claimed that science has solved the problem of perfect ventilation. It consists in removing all the air in a room in a systematic manner, and in a given time, and replacing it by pure air from outside the house. The principles involved in its accomplishment are really very simple, and the modes of effecting it are, however they may differ in detail, resolvable into two, called the exhaust and plenum systems.

In the former, the foul air is drawn out of the rooms and constantly replaced by pure air from the outside, warmed to a proper degree. In the latter, air is forced into the rooms by machinery, and provision made for the constant escape of the foul air.

The former method is better adapted to private houses, schools, and ordinary public buildings, while the latter is more often employed in such large establishments as hospitals, prisons, factories, etc. The exhaust system only will be considered in this paper.

I wish to premise that twenty years ago, as a member of the school board of an Eastern city, I was given full power in sanitary matters, and for ten years planned and superintended the ventilation of the school-houses of the town, old and new, so what I say is of knowledge and founded on practical experience.

To begin with, then, we will suppose that it is required to heat with a hot-air furnace and ventilate a school-house of four large, principal rooms. To heat it in the usual way is to have a furnace with a hot-air chamber, a cold-air box, a smoke-flue, and pipes to conduct the hot air to the several rooms.

It is within the observation of every one that hot air from a furnace, when admitted into a room, at whatever altitude from the floor, rises at once to the top, by reason of its rarity. This air comes directly from out of doors, through the cold-air box, is warmed in the hot-air chamber of the furnace, and when it reaches the rooms above is as pure as need be. If the experiment be begun in the middle of a school session, we shall have a stratum of pure, warm air at the top of the room and the foul air below, and unless some means be provided to withdraw the latter, all the air, by the law of the diffusion of gases, will become speedily foul. Now, if we could have an air-pump of sufficient capacity to remove the foul air at the bottom of the room, through an opening at the floor, as fast as the heated air reaches the top of the room, good, pure, warm air from above must gradually descend and take the place of the foul air, and perfect ventilation result.

It will be readily understood, too, that by increasing the volume of incoming air, that is, by increasing the size of the cold-air box and making a hotter fire, and, at the same time, increasing the capacity of the air-pump, the entire air of the rooms can be changed as rapidly as is desired.

A heated flue affords exactly the kind of air-pump needed. Build a chimney with one large flue proportionate to the number and size of the rooms to be ventilated; carry the smokepipe of the furnace up this, and to the top of this chimney; have proper sized ventilating registers

on a level with the floor of each room and opening into the chimney. These points as to size, capacity, etc., are determined mathematically.

As soon as a fire is started in the furnace, a strong current of air moves up the chimney, coming, of course, through the ventilating registers in the different rooms, and our air-pump is in full operation.

The apparatus is absolutely automatic. The hotter the fire the more warm air is delivered, and, also, the hotter the fire the hotter the flue and the more foul air is removed. In ventilating school-houses, they can be planned so that one furnace and flue will answer for four principal rooms.

In larger houses, heated by steam, the furnace flue can be made to ventilate all the rooms that touch it, and coils of steam-heated pipe, in flues made expressly for the purpose, can do the same for the others.

In the bottom of each ventilating flue there should be a stove, or small furnace, expressly for ventilation when no heat is needed in the rooms.

There should also be a cold-air flue alongside the hot-air shaft, with a valve between, to temper the air when too hot, and to introduce cool air when furnace heat is not needed.

The efficiency of this sort of apparatus can be readily proved. With an anemometer measure the velocity of the outgoing air; then find the delivering area of the ventilating register, and you can figure in a moment how many cubic feet of air are withdrawn from the room in a minute. Now find the cubic contents of the room, and it is easy to know in how many minutes the entire air of the room is changed.

Of course, the more rapidly the change is effected, the more fuel will be required to maintain a proper temperature. One important consideration is, that there is no need of open doors and windows, and the consequent exposure to draughts.

A still greater sanitary refinement can be attained by filtering the air of dust as it leaves the hot-air chamber. It may even be washed and dried, and then warmed to a proper degree, or, in hot weather, cooled by being passed over blocks of ice.

This has been done for rooms from which it is important to absolutely exclude dust. With the double doors and hermetically closed windows, the occupants breathe perfectly clean air, and in dog-days enjoy a most delightful temperature.

I am happy to say that there are two new school-houses in Pasadena thoroughly well ventilated. One was done by the Morgan Heating and Ventilating Company, of San Francisco, and the other by Bennett & Basore, of Los Angeles.

I believe them both to be as near perfection as possible, with a single exception. If the entrance to the cold-air box were outside the building and several feet above ground, much less dust would be carried in.

Bennett & Basore have put their apparatus in thirteen school-houses in Los Angeles. Any one interested in the subject, and disposed to do a little sanitary missionary work in his locality, should visit one of these houses and learn the details of the work.

In ventilating churches, theaters, and places of public resort open to the roof, it is better to introduce the heated air through many openings in the floor and have ample ventilators in the roof, so that the whole volume of air in the building is constantly moving upward.

Trinity Church, New York City, is satisfactorily ventilated in this way; the entire basement being a hot-air chamber.

The principles involved in heating and ventilating, as above outlined, are equally applicable to private houses. It is only necessary that each room communicate with a heated flue.

When a hot-air furnace is used, the main chimney should be made to accommodate as many of the principal rooms as possible, after the manner described for school-houses, and rooms not so reached should have open fireplaces or flues made expressly—a board shaft even will do, heated by a gas jet or even a hand-lamp. When hot water or steam is used, it is a simple matter to heat the ventilating flues away from the main chimney by coils of pipe. It must always be borne in mind that a cold flue does not ventilate, so that, when the furnace heat is not needed, special means must be provided for heating all ventilating shafts.

In small cottages there should always be chimneys enough so that each room can have a flue for a grate or a stove; and the latter, in this climate, should be of the Franklin type, with large smokepipe, so as practically to act as an open grate; while in cold climates each stove should have a cold-air box, so as to be supplied with pure air directly from outdoors, and ventilate into a hot flue. In sleeping-rooms at night, when no fire is needed by day, a gas jet or hand-lamp, or some other arrangement, should heat the flue.

The most disgraceful imposition upon the public is the unventilated condition of hotels and boarding-houses. I have never seen one where systematic ventilation was even attempted. Their charges are high enough to cover every possible sanitary provision, but the bad air the guests must breathe in them is as great (or a worse) menace to health than bad plumbing would be; and I believe it to be as much the duty of the State to interfere to enforce sanitary ventilation as sanitary plumbing.

The chief difficulties to be encountered in securing a general and radical reform in this matter are: popular ignorance as to the need of it, added to ignorance as to *what* to do; while above all others stands the increase in the expense of building, and also the increase in the amount of fuel required. It must be owned that these two items of extra expense required to secure good ventilation, though not large, are still considerable, and important to men of small means; but then, doctors' and undertakers' bills, and inability to work on account of illness, are all expensive, too, and worth evading at any cost.

The average man, in his eagerness for gain, will run great risks to himself and family to save a few dollars; and with him as a landlord, the health and even lives of tenants often weigh scarcely at all.

We must therefore create a public opinion that will compel architects and builders to give this matter their serious attention, and then invoke legislation to secure to the people, first, pure air in all school-houses, churches, theaters, and other places of public resort; then in all hotels, boarding-houses, and places of entertainment; and finally, in all private houses. There should be as rigid an inspection of houses, in regard to ventilation, as to plumbing.

DR. GEORGE L. COLE, of Los Angeles: Mr. President, and Members of the Convention, I certainly have been greatly pleased by this paper, and in it I find nothing to which I could take exceptions. If we could inculcate these principles into the families who come under our care, in the long run we would probably do them much more good than we do by writing prescriptions for them. However, the majority of families cannot appreciate such advice, and I suppose we will continue to go along in the same old way, writing prescriptions for the money there is in it, and the families will appreciate it in their same old manner. It is a difficult matter to get people to put into practice. One thing that occurred to me while Dr. Van Slyck was reading his paper is that medical men, who know full well these principles, are just as slow to put them into practice as are the public—people who are supposed to know very little about them. I think that if to-day we were to start out and go around among the offices and residences of the physicians, we would find that they fail to carry out these principles to just as great a degree as do the people at large.

With regard to the ventilation of houses in this warm country—a semi-tropical climate—I think that the most of our houses are built in such a manner that the air gets through the crevices, and ventilation is much more perfect. The doors are open much of the time, and really I feel that we suffer less from improper ventilation in a climate of this character, than do those who live in a rigorous climate. Yet, we should be none the less careful in following out these principles. I regret that this paper will not reach a larger class of people than it will. I wish that it could be published in such a manner that the people at large might get the benefit of it.

DR. VAN SLYCK: I have just this word to say: that although this is a mild climate, and when the sun shines we can always get along so as to have very fair ventilation during the daytime, the greatest menace to health are the cool nights. The nights are always cool in this country, almost always through the entire summer, and there are so many people, invalids, especially consumptives, who are afraid of the least breath of air from outside; if there be a suspicion of anything like a draught the windows must all be shut, and the most of them sleep in rooms without even a window let down from the top or open at the bottom. A window open three or four inches, and the shade drawn down over it, they think is pretty fair ventilation, whereas it is no ventilation at all. It would be very easy, in building houses, to have some sort of a ventilating flue, which could be heated if they could not afford an open fireplace or anything of that sort—just a simple flue heated by a lamp or a gas jet, would afford good ventilation for a sleeping-room. If I were to advise a consumptive patient in preference to any other kind of treatment or any kind of medicine, it would be to insist upon having a room with an open fireplace in it, or I would ask him to hunt the town over until he found a room where he could have an open fireplace, and then the thing would be in his own hands. If it gets cold in the evening he could have a little fire, or even a lamp in the fireplace to ventilate at night, because he will not have the room open, for he is sure that he will catch cold if he does.

THE PARAMOUNT SANITARY NEED.

DR. NORMAN BRIDGE, of Los Angeles: Dr. Van Slyck's paper certainly is a most admirable one, and it included a great deal of what I should have said had his paper not been read. It seemed to me, and it seems to me now, that there is among all the sanitary needs one that is paramount. And when we say a sanitary need and refer to the sanitary need that is paramount, we of course understand the one that is possible of accomplishment or supply. There are a great many things that we would like to have for our comfort that are impossible, that are not attainable, and we should not speak of those in a practical discussion like the discussions that should be had in a convention of this sort.

Dr. Van Slyck has very well stated the different and several harmful influences that are brought to bear upon human beings in the shape of bad foods and poisons, and he might have added injurious occupations and all that—infection and so on. He has hinted at, indeed, he has stated, what the paramount need is. The paramount need is a need of a reformation in our mode of living and life, that is attainable to a certain degree. It is better ventilation for the rooms and in the rooms that are occupied by people when they are at rest; namely, when they are sitting and when they are sleeping. The ventilation of rooms that are occupied by people when at work is not so important, because the doors of nearly all rooms, factories, and stores are being opened more or less by people coming in and going out, and that makes a little ventilation. In some cases machinery is in operation, and that produces some ventilation. In many of them heat is present, and that produces ventilation. Besides, people can work at a lower temperature, and they are therefore not as subject to colds from draughts.

Therefore, I believe that the necessity of better ventilation for people when they are sitting in sitting-rooms and when they are sleeping, to be the paramount need, in a sanitary way, that is possible of attainment. Dr. Van Slyck has explained, in a very forceful and minute way, how rooms should be ventilated, how houses in general should be ventilated, and he has spoken of some methods of ventilation in a private way and an inexpensive way that I confess I had not thought of, or if I had I certainly had not thought of it in connection with this discussion. Everything that he has said about this matter is wise, and it is a matter of great moment, I think, that the profession of medicine should take up the systematic discussion and advocacy of laws for better ventilation of new houses. We cannot bring about legislation for ventilation of old houses, but it is as proper, as attainable, it seems to me, to insist on some means of ventilation in new houses as it is to insist on correct sewerage and correct construction in other directions. But even if we should agree that we would unanimously memorialize the Legislatures of States and the Common Councils and Boards of Trustees of towns, and even if we should succeed in accomplishing a rigid system of inspection of plans for new houses, to the end that they should all have some means of ventilation, it would be a long time before we would do very much good. However, it would gradually educate the people, and the advocacy of these measures would educate the profession in the right direction.

Now, the question to me, and the question for all of us, is, can we not do something without involving the expense of new houses and additional facilities in new houses—something that will not involve the necessity of legislation at all, but that will simply grow out of education of the public and the systematic work of the profession? The profession does not need to be educated about these matters. The profession knows, and, as Dr. Cole has well said, the profession neglects. It knows well enough the people ought to breathe pure air, and it knows well enough the people ought to have houses so constructed that the inhabitants may have good air, and yet it allows people to go on building houses in the most abominable way imaginable, exactly as though the profession had entered into a league to increase its own business. Of course, the thing is improbable that any doctor would allow a patient or a friend to build a house in an unhygienic way simply for the purpose of bringing himself more business. But it looks that way, and it might be well charged upon us from the outside. It seems to me we can do a great deal in a particular direction, without expense and with the facilities at hand, with the miserable houses and miserable tenements and miserable hotels and boarding-houses exactly as we find them.

We spend in the rooms that I have referred to—the sleeping-rooms and the sitting-rooms—at least ten twenty-fourths of our time. So, all that Dr. Van Slyck has said in arraignment of the bad air and living in bad air of the sick and the well is true as to most of us—ten hours out of twenty-four, at least. It is true as to some of us for twelve hours out of the twenty-four. We are breathing just such contaminated and miserable atmosphere as the doctor has referred to. The injury from breathing bad air can be understood better than any other way by noting how breathing good air serves the sick and serves the well, and that Dr. Van Slyck has set forth in his exposition. We send patients away from home that they may live in the open air, and the consumptive patients occasionally get sent out to some place where they can live in tents, simply for the purpose of giving them fresh air. If a person droops and becomes debilitated and loses his appetite, we are very likely to say he should have an outdoor occupation; that he is too much confined indoors. It seems to go without saying, it seems to be a matter of common knowledge, that indoor life is the bane of mankind, which is true. It is the bane of mankind. As the doctor has also said, soldiers do not take cold; soldiers in camp life are usually healthy. They sleep on the ground, covered with only a blanket; or they sleep in tents. They do not take cold; they are healthy and vigorous. When they go back to home life and live in rooms, they begin to take cold. The reason why most of us take cold is that we are lowered in our physiological standard. Let indigestion come, let a lot of fresh ptomaines be produced in the alimentary canal, to be absorbed, and a person will take cold twice as readily. It is not the draught, it is not the chilling to the healthy person that produces the common cold, but it is these influences to a debilitated person, a person debilitated from any cause, and the debility incident to breathing over and over the atmosphere of a room contaminated with one's own breath and with other contaminations—these things, I say, are among those that most powerfully lower the vitality and produce the susceptibility to cold.

What is good air? What constitutes good air? It is a thing that we don't stop to think of, as a rule. Dr. Van Slyck has set forth some of

the contaminations of air, which make air bad, and one of the contaminations is carbonic acid gas. That is true. He don't say how much carbonic acid gas. By the same reasoning, how much other contaminations do we find in rooms occupied as sleeping-rooms and as sitting-rooms? Of course, it varies a great deal; but, as you will remember, the atmosphere out of doors contains perhaps four parts of carbonic acid gas to ten thousand; three in some parts, but not more than four anywhere. In the average room occupied for sleeping purposes among the common people, I have not a doubt that the proportion is four to eight times that amount. It is the judgment, I believe, of all sanitarians, that the amount of carbonic acid gas indoors should be kept down to at least twice what it is out of doors. So that if it is three and one half parts in ten thousand out of doors, it should never be permitted to be more than seven indoors; seven or eight, we will say. I wonder how many of us stop to think, as we go about in and out of rooms that are stuffy, and as we advise the sick and the well, and the sick living in rooms, I wonder how many of us stop to think how much fresh air is required to keep down the carbonic acid gas to twice the quantity in the air out of doors? It requires something like three thousand cubic feet of air each hour to be introduced into the room for each person. How many sleeping-rooms in the best houses, how many sleeping-rooms occupied by doctors, are ventilated in that way, do you suppose? Certainly, very few. Yet that is attainable. It is perfectly possible to have that. With such ventilating flues as Dr. Van Slyck has referred to it could be done without any difficulty, and a quantity of air like that can be introduced into a room, if it be introduced in the proper way, and it will not produce a perceptible current. But let a current of air be perceived by any person, and he straightway will believe, unless he is a very exceptional person, a decided exception to the general rule, that he is about to take cold, and he will stop that draught or that current of air in some way or other.

What prevents the reformation? What are we to do, what can we do, about it? The common belief on this subject is that night air is harmful, and that currents of air are especially prone to produce colds; moreover, that colds—cold-catching—are the great bane of our lives and the beginning and cause of a large number of mortal illnesses. I am sure that we can never accomplish much good in the direction I have indicated until and unless we can convince the people that they are mistaken in two or three particulars. In the first place, we should endeavor to convince them that the night air is not poisonous and is not harmful in any way. That seems a strange proposition to be made in a medical association—to need to be made to a medical audience; and yet that is one of the directions in which, if we are to accomplish any good to the public, we must work with the people. A great many doctors curiously have the impression that patients must run indoors from the night air—go in as soon as the sun approaches the western horizon, and not come out until it is one or two hours high in the morning. Nearly every sick person who comes from the East into this quarter for his health, and practically all—the majority, certainly—of the well people who come here to live, are told by dozens of people, old settlers, that the night air is dangerous, that it is always cold. It is cold, it is true. They are told that they should go indoors about four or five o'clock in the afternoon, and not appear outside again until eight or nine o'clock

in the morning. So that, if they take that sort of advice, they are sure to be housed twelve or fifteen hours out of the twenty-four. If the night air is harmful, it is harmful to let it into the rooms. Of course, it is night air in the house as truly as it is out of doors. But the people don't understand that. They understand that the atmosphere in the rooms is somehow safe to be breathed, but that the atmosphere out of doors is extremely harmful. There never was a greater heresy on earth. There cannot be a greater heresy. Night air is distinctly a cleaner air to breathe than the day air, and a better thing to breathe than the day air. It has considerably less dust, and its microbes are only about forty per cent of the day air—microbes of all sorts. Of course, the majority of microbes are not pathogenic, as we all know, but the microbe and its admixture of the night air probably do not amount to more than fifty per cent of those of the day air. There is only one trouble with the night air—it is colder, and that is all there is about it. If we could remove the impression from the public mind, therefore, that this is a harmful thing, we would accomplish a very great good. It would remove this bugbear of terror from the minds of the sick, and they would be willing to breathe the night air if they could somehow do it without taking cold.

A person will not take cold by reason of cold air or moving air, provided his body is warm at all times; and, therefore, a patient may sleep in a tent, or under a wagon, or in a room with windows on nearly all sides, and windows wide open, and he may feel the current of air over his face every moment he is awake during the night; yet he will never take cold, provided his body is warm; and any person who has any considerable proportion of the normal vitality of the human body may keep his body warm by clothing it in wool. Therefore, one of the first steps for the profession to take, I am sure, is to convince the sick, certainly, and the well as far as possible, that in a country like this, where there is such a difference in the temperature of the day and the night air, and where so few houses are warmed in the night, that people should wear woolen night-gowns, and, if necessary, in the winter time, should sleep between woolen blankets instead of cotton sheets; and, if necessary to protect the head, particularly if it is bald, from sensations of a draught, they should wear woolen night-caps. If they will do this they may be told, without any danger of a mistake, without any danger of accident, without any danger of their demonstrating that we are wrong, that they will not take cold, that they cannot take cold to save their blessed lives, if they will do these things. If we could do this for the sick we would remove one of those obstacles, I am sure, to good ventilation for sleeping-rooms. These people with the miserable rooms they have, therefore, may have good ventilation when they are asleep. There is no difficulty about it at all. They have to be convinced, however. They won't believe this at first, but a reasonable patient will nearly always believe it. I have had a good many dozens of patients in the last five years here, who not only have believed it, but also have demonstrated it, and I will relate the experience of one of them—a tuberculous patient, who lives at Redlands. He was very much surprised when told that he could sleep in the open room, and that he had better sleep in a tent; that he might feel a current of air over his face without taking cold. He said he would try that, simply to see whether it was true or not, if for no other purpose. A year ago last fall he went

back to his home from his vacation at the seaside, and constructed a tent on the veranda of his house, that was twenty feet long and about five or six feet wide; and he put his bed in there, and slept in it all winter, sleeping in woolen blankets and woolen night-gown, and a woolen night-cap over his head. The wind blew out one end of the tent and he never replaced it, but put his bed up to the other end, and let the wind blow and the rain come. He never caught cold, and he came down to me last year, as ruddy and vigorous looking as any person in Southern California or any other place in the world, declaring that he had not only not taken cold, but also had a very enjoyable time. Similar experiences have come to a large number of patients, but certainly only a few have made so severe a test as this man did. I am positive that this bugbear of a current of air endangering life to a person asleep, even if he is warm, is one of the greatest obstacles to a restoration of health, and one of the greatest obstacles to the keeping of health on the part of well people in this part of the country.

This problem, therefore, is easier of solution than the problem of the sitting-room. A person can clothe himself and get into bed and throw the windows up, and never mind if it is cold; he can keep warm. He is still; he is surrounded by a large amount of clothing. He will do this more readily than he will sit in a room to read his paper or to read a letter, or to play cards with his friends, or to chat with them, with good ventilation, when his room is very warm—and here we are confronted with some difficulties like those suggested in Dr. Van Slyck's paper. It seems as though we must have ventilation in order to have health. We certainly must in sitting-rooms. Better ventilation is needed there than in sleeping-rooms, for the reason that there must be lights, and unless the lights happen to be incandescent lamps, of course they destroy more or less of the oxygen in the room. Moreover, the oxygen of the room is frequently harmed by the heating apparatus. A gas stove unconnected with the chimney, or a kerosene lamp, is very likely to be the means of heating these rooms among poor people. They will not ordinarily, therefore, have good ventilation. How can we induce them to have good ventilation? How may we change their circumstances? One of the first things to do, I am convinced, is to induce them to clothe themselves better as they sit in their sitting-room at night. And so invalids, and all people, should be urged as far as possible to wear like underclothing the year through, as thick underclothing as possible, even in summer—woolen underclothing, or linen woven in such a way as to produce a large number of air spaces in the clothing, and covered, perhaps, with a thin layer of wool—and to regulate their attire for the fluctuations of heat at different times in the day by changing overclothing. I know it is a difficult thing to do, to induce people to make such changes as I have indicated, because people will forever endeavor to put on thin underclothes in the summer, and thicker ones in the winter. It is just as well, and better for that matter, to wear thick underclothing throughout the year, and to take off a change of overclothing for the heated mid-day. I think if the profession would endeavor, it could educate the people largely out of the habit of wearing the same overclothing night and day, evening and mid-day, and morning and mid-day, through the summer. If more underclothing were worn, and when needed, a thicker coat put on—a little wrap put over the shoulders by a woman, a thicker coat by a man—it would be found

that ventilation of sitting-rooms in the night and evening would not be so objectionable as it is.

What can be done in the matter of heating sitting-rooms? Dr. Van Slyck has told of some of the means and of the best means. The great difficulty, the great obstacle in Southern California, is the expense of heating. There is no doubt about that. Fuel is high. Therefore, the fuel should be made to tell to the utmost in the production of heat. Valuable as fireplaces are for ventilation, they are very bad from a standpoint of economy in heat. It was long ago demonstrated that a fireplace only gives the occupants of a room about ten per cent of the heat of the fuel, and ninety per cent goes up the chimney. A tubular furnace, or a tubular stove put in a room—a furnace under the room, if you please—will preserve to the occupants about ninety per cent of the heat produced by the fire. If we cannot induce people to build houses with furnaces constructed as Dr. Van Slyck would have them, we can induce people now and then to put into the basement, in order to supply the sitting-room and the hall of the house with warmth, a common heating stove, and to have that surrounded by a double wall of wood or a wall of brick, and a current of cold air brought in from outdoors, to deliver fresh air into that chamber around the stove. A register in the floor above will enable the family to receive the benefit of probably forty per cent more of the heat produced by a given amount of fuel than is accomplished by a fireplace. If expense is an object, and if it is an object to economize in the fuel, have a common heating stove put into the middle of the room, or near the middle of the room, a little distance from the fireplace, and have it discharge into the fireplace, the front of which shall be covered by a piece of tin or sheet-iron. I know that Dr. Van Slyck would say that that prevents ventilation, but that makes heat cheaply, and if you can induce a person to introduce that sort of heating apparatus for the purpose of economizing in heat, he may ventilate his room and is more likely to open the windows and ventilate it in that way; so I think a greater good would be accomplished than by leaving the fireplace open and allowing the individuals to continue in their efforts to economize by building a fire only when it is very cold, and then a very little fire, and shutting the windows for fear of the cold air lowering the temperature of the room. Of course, lamps and gas stoves unconnected with chimneys are abominable, and no physician should allow one of them to be used without protest. If we could accomplish some of the ends that I have indicated, that should make and would make this southern country a sanitarium truly. There is no reason why the invalids coming here should not breathe fresh air twenty-four hours of every day. As a matter of fact, most of them now breathe fresh air about ten or twelve hours every day. They breathe an air that is unfit to be breathed by a healthy person ten or twelve hours a day, and it rests with the physicians whether they shall do it differently and better. We would lessen the death-rate, we would lessen the ratio of sickness, if we could institute these reforms. But in order to accomplish anything in this direction the people must be convinced. There is no other way, and the profession is the only instrumentality that can convince them. We cannot depend upon any other class of persons whatsoever. A few non-professional sanitarians can accomplish practically nothing. The medical profession can accomplish a great deal, and if it will act unitedly in these matters, it can accomplish a very great deal.

I am sure that the points that I have made are the most important ones in accomplishing the purpose referred to. We must convince people that the night air is safe to breathe, and indeed better than the day air, and that statement should be made over and over again and harped upon so that the public would come to know that somebody disbelieves in the common notion of the harmfulness of night air, and that that somebody is a doctor or a professional. Then people must be taught, and particularly invalids, that cold-catching is impossible from moving air if the body is warm; that a person whose body is warm, whose top head is covered, may be exposed to the wind all night and cannot take cold to save his life. Then we should endeavor to induce people to heat their sitting-rooms better, and insist on their clothing themselves at night so that they will be able to have the ventilation that can be gotten through the windows of any room that even a poor person may be compelled to occupy, and we will head off another great injury to the sick. I am reminded of a difficulty, and it is interesting, and I speak of it because it is interesting, and it is vital to some—the notion that the sick have about being out of doors and staying out of doors. You tell an invalid, particularly a pulmonary invalid, that he must stay out of doors so many hours a day, and he will endeavor to accomplish that. He will go out of doors at a certain hour, and he will put his overcoat on, perhaps, if it is cold, and in order to prevent cold-taking he will walk; if he is able to get into a carriage and ride, he may do that; if he can afford a horse to ride, he may get a horse and ride, but it will fatigue him greatly, and if he walks to keep himself warm, that will fatigue him. I have known a good many pulmonary patients, I believe, to die, who might have been saved for a long time, if not restored to health, by simply taking too much exercise. I think it is one of the foolish injunctions put upon a great many pulmonary individuals, particularly upon those that have fever, to exercise much. I personally believe that pulmonary patients who have fever should exercise very little, and that none of them should ever exercise beyond the desire of his muscles for exercise. When we go out in the morning we stretch ourselves, or when we get up, before we go out, perhaps, and it does our muscles positive good, and gives us joy; and when we go out in the morning we walk around the block, or perhaps a mile, and there is positive muscular pleasure in doing that. The patients know that. The patients do not know how they can be out of doors without riding or driving or walking, and not take cold from chilliness. When told that if they sit on a chair on a veranda, and put on an overcoat—a thick one, mufflers around their necks, if necessary—and cover their knees and legs and feet with a blanket, a heavy blanket, it is exactly as though they were riding in their own carriage—when told that they can do this they are greatly surprised. It is a brand new idea, and many of them are slow to adopt it; and those that do seem rather pleased with the idea, and surprised that they had not thought of it before. It shows how we fall into ways of doing. We get notions that become automatic to us, and to the sick especially, that are erroneous, and it needs some scientific person to remove these notions. I know I have helped a good many patients, and I presume many of you have, in this very direction, by showing them that they could sit out of doors in a chair on the ground, if well wrapped up, and that they would be just as well off as though they were riding in a carriage that cost four or five dollars

a day. I believe that when we go at it systematically we can convince people, particularly invalids, that they can do these other things, and so we may accomplish the paramount need in a sanitary way.

DR. W. F. SOUTHARD, of San Francisco: Mr. President, I have unfortunately given but slight study, and that in no systematic manner, to the subject under discussion. I am, therefore, wholly unprepared to give this question that consideration which it should have. Private hygiene and public hygiene, ventilation of dwelling-houses and public buildings, and kindred subjects, should receive the most careful attention of every physician, for we cannot expect the general public to understand the great importance of these questions in advance of those who should be their teachers in all such matters. The practical application and demonstration of this knowledge should be at the bedside of our patients. It is usually believed that the medical profession is educated upon all of these questions. Is this true? As a class, are we sufficiently well informed regarding hygiene, ventilation, foods and their preparation, to warrant patients to accept our dictum as final? It must not be forgotten that the people are being rapidly educated by the daily press, magazines, and current literature; we must, therefore, be prepared to meet our patients with intelligent answers to the numberless questions which they are continually asking.

All the legislation in the world will not amount to a hill of beans, provided it has not the support of the public; it is, therefore, absurd to think that we can make people take care of themselves by act of legislation. On subjects upon which the public are fairly well informed, legislation may be made effective: such as plumbing laws, vaccination laws, and quarantine laws.

One of the most important subjects, and perhaps as little understood as any, is that of ventilation and heating of rooms. The proper supply of fresh air to the inmates of sleeping-rooms should especially be commended to the attention of physicians. One third, at least, of the twenty-four hours is spent in the sleeping-room; another large portion is spent in living-rooms. The air of the bed-room is vitiated by the poisonous exhalations from the inmates; the living-rooms have, in addition, stoves, lamps, and gas to pollute the atmosphere. The air of the living-room is usually kept in motion by frequent opening of doors and windows, and the movement of people in and out; hence, this atmosphere is less dangerous than that of the sleeping-room. Dr. Van Slyck and Dr. Bridge have spoken on these points so well, I fear that I can add but little which will be either interesting or valuable. I desire, however, to emphasize Dr. Bridge's remarks upon the prevalent idea that night air is deleterious. It is singular how widespread is this notion that night air is unwholesome; the average person fears the night air more than he does re-breathing his own bad breath charged with carbonic acid gas. I have not infrequently been asked by patients if it was safe to keep a window open and let the night air into the bed-room. I have but one answer, viz.: "You have no other air to breathe excepting night air." Our aim is not to keep out the night air, but to have it as fresh as possible, that it shall displace the carbonic acid gas thrown off by the lungs.

There are many points of great interest which I should be pleased to discuss, but the number of papers yet to be read will prevent. I would add that physicians in visiting the sick-room should note the general sanitary condition of the house and its surroundings; the ventilation

of the sick-room; if in a private house, see if the air which is taken into the sick-room is brought in from some damp, ill-smelling area between other buildings, or from the cellar (as is generally the case), or does it come in fresh and uncontaminated. The question of food is of equal importance—its kinds and quality, its methods of preparation, and best of all the care in serving it so that it may be attractive and palatable to the patient; this is worth as much or more than the drugs prescribed. The physician who is thoughtful as to these matters will meet with greater success than he who gives little or no attention to details.

It is most unwise to permit plants and flowers in the sick-room or even in the sleeping-rooms. They look well, but are deleterious to health. Unless the air be pure, the strongest and healthiest person will in time suffer from its effects; he will experience a deterioration in his physiological system which will make him susceptible to disease.

Before I sit down, let me allude to a subject which has not been touched upon in any paper or in any discussion during this session. I refer to that abomination of abominations, the Pullman palace sleeping-car. I speak feelingly upon this point, as I came down on one last night. I see that I have struck a responsive chord in your hearts. It is a difficult matter to find language to express my sentiments concerning this chamber of horrors. Every one who has traveled much in these gilded saloons on wheels must have at times experienced the ill effects of a night spent on one of its shelves, which, when inclosed by curtains, gives one a sensation not unlike that of being in a closed box. Is it any wonder that, in the morning, many of those who have spent a night in a Pullman sleeper feel unrefreshed and tired; a bad taste in the mouth, and a dull headache? Several persons in our car awoke this morning with headaches, which did not pass off until this afternoon, and which were wholly due to the vitiated air in the sleeper. In the upper berth one gets the benefit of all the bad air which comes from below and from the horrible oil lamps which should have been banished years ago to the ash heap. The porter always turns down those which he does not extinguish; the gas arises from these partially burning lamps, and one entering a sleeping-car at night cannot but notice the combinations of coal-oil smell and the odor of vitiated air. The upper berths are in line of currents of air from so-called ventilation which do not carry off the products of combustion, yet are draughty. The lower berths are so shut in that the sleeper must necessarily breathe over and over again his own poisonous exhalations. These cars are either overheated or underheated—at one time you are in perspiration, at another you are freezing—there is nothing equable about their temperature. Hundreds of thousands of dollars have been spent in devising a car which must be acknowledged to be beautiful to look at and easy to ride in, but far from healthful. The day-car or tourist coach is much more healthful, for, though it gets pretty dusty, it also gets more fresh air. Then the bunks of these cars are cleaner at all times for not being upholstered. The old English compartment car, which obliges one to sit up, is less deleterious to health than the most magnificent Pullman car.

I have touched upon only one or two of the many subjects which ought to be of interest to all persons, especially to sanitarians. Dr. Van Slyck and Dr. Bridge have given us much food for thought and many valuable suggestions, which we should endeavor to follow.

DR. D. B. VAN SLYCK, of Pasadena: All of Dr. Bridge's remarks were certainly admirable, and I wish to refer, in continuation of the allusion in my paper, to the treatment of patients in Switzerland. They are kept in the open air, in the way Dr. Bridge suggested, when the thermometer is only 10° above zero, or down to zero. They are kept warm by clothing, but still kept in the open air in easy chairs. Dr. Bridge suggested a stove in the middle of the room, when the expense of fuel was an object. It is very easy with a stove of that sort to have excellent ventilation at no additional expense to amount to anything. Of course, the stovepipe goes into the chimney, and the chimney is a heating flue. If you have what corresponds to the cold-air box on the furnace to deliver air into the stove, you have a cast-iron cylinder with a sheet-iron casing to it. The cold air comes up from underneath, is heated the same as in the hot-air chamber of the furnace, and passes off into the room. If you have a ventilator at the bottom of your chimney, you will have as good ventilation in your room as you can get from any other appliance. The air is taken out systematically from the bottom of the room. The cold air is brought in from out of doors, is heated by your stove, passes up to the top of the room, and then descends; and it is easy to have a sitting-room heated and ventilated in the same manner in that way. It is no waste of fuel, and with your window or door open you can have most excellent ventilation.

THE GYMNASIUM FROM THE STANDPOINT OF THE SANITARIAN.

By W. W. HITCHCOCK, M.D., Los Angeles, Cal.

It may be said that there are two kinds of doctors—one caring for health, the other for disease: the former striving to improve and preserve, while the latter trains his mortar too often in the ranks of the angel of despair. Certain it is that the one cared for comes out ahead. At one stage in the history of civilization, the great man was the one who overpowered all others by physical strength. He soon gathered around him a retinue of weak followers, either as subdued competitors or as weak dependents, who must seek some strong person for protection. This condition evolved great physical hardihood and endurance, coupled with that all-important attribute, which we now term "resistance to disease, or immunity, so important in its relation to the longevity of man."

It is safe to say that for the last three quarters of a century the history of civilization must record rapid physical deterioration among the families who have been most active in evolving new ideas for the refinement of life and the amelioration of its hardships, until now we are trying to find with the microscope some substitute, to be injected under the skin, that will, *ad libitum*, produce immunity—an impossible substitute for physical force, branding ourselves as a race of lazy, shiftless creatures, suffering from inaction and disease. The trend of development has been, and is now, too much for brain and not enough for healthy bodies, and yet we know that this is an impossibility.

Medical science has done much, by discovery and the promulgation of physical laws and hygienic principles, to avert disaster by eliminating many deleterious influences that act with special potency against the

weakened and delicate. The beneficent influence on humanity has been partly overcome, however, by the rearing of weaklings whose career would have been short under less intelligent care; but, neglecting this part of the race that is doomed to natural extinction, we find that medical science has done nothing directly to avert the calamity that has menaced civilization from extreme specialization. The evil effects of over-mental stimulation without a suitable physical basis for support and expression of nervous phenomena, were first observed by educators and those engaged in training in some scientific pursuit. Ling, of Sweden, gave his life to the study of the needs of the body, and established a system of exercises that would do for the body what the routine of study would do for the mind. What Ling did for Sweden, John did for Germany, which resulted in sufficient improvement in physical stamina and patriotic zeal to drive Napoleon out of the empire.

The purpose of this paper, however, is not so much to call your attention to that which you already know, as to offer some few suggestions for discussion as to how the gymnasium may be used in a sanitary sense by the physician and master of physical training.

It is principally our business to deal with those who are physically weak, as they are the most susceptible to disease. Our mission as sanitarians being that of prevention rather than of cure, is it not possible that we can, in some way, point out a corrective for the defective bodily development, the harmonious action of which is so important to health? It is all apparent that what is done in this direction, especially in our large cities, must be done through artificial measures; and in response to this feeling of a need of improving the physical side of our lives, there has been a widespread movement toward the formation of clubs for exercise. In the cities these clubs have provided large and well-equipped gymnasiums for the use of members; *e. g.*, the Y. M. C. A. have been the pioneers in this work of improving the physical status of the young. In many of these, however, there has been and is an appreciation of imperfect, if not disastrous, results from lack of intelligent direction and competent instruction.

The gymnasium has been compared by some one to a drug-store—full of good things if intelligently used, but full of evils if indiscriminately taken. The question is, then, what use of the gymnasium will be best for the individual case? It should be conducted with as much care as the physician would exercise in treating a patient—recognizing every symptom, as it were, and then specifying correctively and not indiscriminately. The director should know what material he would mold and develop, and frequently examine to see if the results of his treatment are satisfactory or such as he expected, and keep a record of the past conditions, for a statement of a size or strength in figures is worth a dozen faulty opinions, and this, too, before disaster comes and discredit is thrown on the work.

Science has taught us that in living organism functional activity must be kept up, or there will be no development; and parents should be as zealous that their children should be as punctual and constant with the development, in the gymnasium, of some physical defect of their body, as they are in developing the brain by pursuing their mental training. Predisposition soon stamps as a type a deformity that has been developed in two or three generations, and succeeding generations that do not possess that peculiarity are looked upon almost as new varieties. This

is especially true of physical defects that impair the vitality of the parents. Notice, if you please, the stress laid upon this law by life insurance companies, whose business interests have no bias from sentiment. The excellent health of the applicant is not enough, if there be a record, going back two or three generations, of degenerative diseases that have proved fatal, or if constitutional vigor has been so weak as to let the life go out at about forty-five or fifty years of age from any immediate cause. The risk is poor.

The important lesson from this observation is that health cannot exist if vital organs are seriously undeveloped. Health is the condition of harmonious action and adjustment of all the functional activities; for instance, a normal pulse-rate is from seventy-two to seventy-six beats per minute under ordinary conditions of rest, but a pulse-rate of seventy-two after a half-mile run might be considered abnormal, and the ground for solicitude, for health would demand an increased activity of the heart muscle to supply increased blood currents to active muscles, that waste products may be eliminated and restorative elements be supplied. This is not all that is required, for there must be a corresponding increase of respiratory movements for oxidation and elimination. And so the perfect activity of any organ is shown to be dependent on the healthy activity of others; while the converse may be stated as a physiological truth, viz.: that imperfect action of any organ impairs the function of all others to some extent. A healthy muscle is, then, dependent on a healthy stomach, heart, and brain, no less than on good food, air, and sunshine; while the more refined intellectual processes are also based on a normal condition of the physical organs. Much may be accomplished by a dyspeptic, so also may a cripple go a long distance on crutches; but a healthy child is better fitted for study than a puny one, and health should be the first thing sought in our schools that are educating our children for the duties of life.

It seems strange that a healthy person is the exception, and not the rule. It is about as difficult to find a healthy person as it is to select a sound horse. There is an opportunity for the bold, new woman to change the destiny of the nation and accomplish a sanitary reform by invading the so-called first circles of society, and making it fashionable to be healthy. During our late war, when the drafts were ordered, many an apparently healthy man, who had carefully concealed the fact that he was diseased, under the searching examination of the army surgeon was compelled to surrender the secret and beat an ignominious retreat toward home, entirely deprived from taking part in the glory of the war.

Disease affects us religiously as well as socially. We frequently encounter those who claim to hate the world and live far above its pomp and vanities, and who have persuaded themselves that it was the legitimate result of their deep religious convictions, when in truth and in fact they were unable to make a distinction between a quickened conscience and a torpid liver. Yes; want of physical health does even more than this. It impairs our spiritual vigor. It puts us out of harmony with ourselves and everybody else. It begets a spirit of worry, and engages mankind in a senseless combat with the inevitable. This shortens life. It reinforces disease. If this be true, anything we can do to improve the physical stamina increases the powers of resistance to disease, and is an important sanitary measure. A clumsy person is in a certain sense a sufferer from partial paralysis. There are unde-

veloped nerve centers or nerve fibers that, if not quickened into life, will continue to degenerate, and in their decay will involve or at least affect other centers. At a recent visit to Glen Ellen, the Home for the Feeble-Minded, in the northern part of the State, the Matron, Mrs. A. E. Osborne, called my attention to the fact that the children, even in the higher grade, were all poor walkers, which illustrates this to a remarkable degree.

The acquisition of new powers over reflex or complicated movements is much more rapid in early life than after maturity. The old saying that "it is hard to learn old dogs new tricks," had its origin in this tendency to persistency in any habit of body or mind. A system of education that has in view the symmetrical relations of mental and physical qualities, cannot ignore the necessity of beginning physical training with the mental. The child should come under the care of an experienced instructor in physical training from the day of entrance to regular school life. A physical examination should be made that should determine the condition of heart, lungs, spine, muscles, skin, eyes, and ears. Many a case of incipient disease that eventuates in disaster would be discovered and put in the care of a physician, if necessary, or a correct régime of diet, sleep, exercise, etc., inaugurated, with the aid of the parents, that would counteract the tendency to disease or deformity, and save the child as a useful member of society. This following of the laws of health would paint with healthy blood the roses on the maiden's cheeks in such fast colors that more admiration would be excited than by tons of the two-bit article purchased at the drug-store. Many parents have no idea that there is in their children a deformity which menaces health, until a stranger points it out to them. It is not natural for us to observe our own defects or those of our children; which comes of our innate selfishness. The physical care of our children is as important as their mental training, and should go hand in hand. Not all can be attendants of the industrial schools, and if the State has power to take the children from our homes, five or six hours a day, she should see that, while there, their physical needs are looked after by competent physicians and physical instructors, as well as by idea-builders; for, what good is a store of mentality resting on a shattered frame?

Every ward of every city should have its physician and gymnasium-master. You may say that physicians do not take up the study of anthropometry, and that there are few competent gymnasium-masters. This is because there is no demand at this time. Such a demand should be created, if necessary, by revision of our laws, so that the labor of our teachers can be lightened and a just division made between mental and physical development, which will have a tendency to round out and make strong the whole, and not develop a part to the detriment of all.

There is another feature in relation to the gymnasium as a sanitary measure concerning medical men, about which I wish to speak, and that is, corrective work. Lack of development of certain parts of the body, as the thorax, particularly noticeable in those who are predisposed to pulmonary disease. There is no doubt that, if as much care were bestowed on our young in seeing that this particular part was developed with that care which the brain receives, tuberculosis would almost disappear. This has been clearly demonstrated in an able thesis written by Dr. S. A. Knopf, an extract of which appeared in the October number of the New York Medical Journal of 1895. Dr. Knopf's subject is

the Treatment and Prophylaxis of Consumption in Sanitariums—he might have said, with equal propriety, gymnasiums. In this thesis, which is the most exhaustive it has been my pleasure to read, it is clearly shown that if consumption be ever cured, it will not be done by antitoxines or medication so much as by educating the predisposed how best to establish a resistance to the progress and advancement of the disease. It would, therefore, seem that if tuberculosis had occurred in two or three generations, care should be exercised in regard to the thorough development of the chest, also the same care regarded in the avoidance of excessive exercise, such as would be required in many athletic sports that would seem at first thought especially suitable for a person predisposed to the disease.

To know a man well you should know his ancestors. It is therefore necessary and important that not only a thorough physical examination of each individual case be made, in order to find the physical defects, but also that the history of antecedents be noted. The condition and environment of the subject are also valuable in making a prognosis of the future history of the case. The boy who comes to school from the farm or workshop may be no better developed than his classmate, who has never known what physical work is, and be able to endure twice as much prolonged physical strain. His life has been spent out of doors, and he takes kindly to outdoor sports. The city-bred boy has a latent aptitude for anything, and with proper physical training is a strong competitor with his country cousin in any physical exertion.

The rush to and crowded condition of our cities, together with all forms of ingenious devices to lessen physical labor, are, no doubt, born of evil results that would naturally come of neglect in the form of retrogression and disease to the weakest part of the body. If this be the tendency of our so-called higher education, it is time the pendulum was set swinging toward a happy medium, and have the physical powers and the mental trained alike. Not until this is done will there be any material diminution in mortality statistics. With all our new remedies, with but few exceptions, there has been little change. Shall we still persist in our fruitless attempt to fight disease absolutely with drugs, when we know, as sanitarians, that the safest method of all is prevention? Can we conscientiously continue to practice medicine as an applied science, and permit consumption to destroy one sixth of the human family? Is the profession, folding its hands, willing forever to avow that the hectic flush on the cheek of youth must be the auroral flashing, heralding with certainty the approach of the cold winter of death? As sanitarians, inquiry should be addressed not only to the avoidance of disease, but also to the best and surest means by which resistance can be secured by individuals predisposed to special forms of disease. We should not forget that the children are to be the fathers and mothers of the succeeding generations, and that to be healthy is one of the greatest blessings of earthly existence; that the tendency is now, and has been for several generations, toward over mental training to the neglect of the physical; that this has resulted in defective bodily organization; that the human organism, like the chain with one defective link, is weak throughout; that, as a people, we are selfish and clannish, not apt to see ourselves as we really are, and should think and discuss what may be done in a corrective way. I have made particular mention on training and development of the chest, owing to the prevalent neglect of this

part of the body and the difficulties encountered in convincing people that no remedy has yet been found for the cure of these diseases.

Sanitarians are the guardians of public health, and the condition of future generations, both as regards physique and longevity, depends largely upon how well they are instructed and educated by them. In cities we should depend for corrective work upon the gymnasium, under the charge of competent instructors, presided over by a physician, and abandon the many worthless mechanical devices, and substitute brawn and muscle—a self-sustaining and reliable attribute. Man is the noblest work of God, and we should see that no loss in His physical image, by deterioration through negligence, should take place. From the human brain have come the wonderful conceptions revealing some hitherto hidden law of the universe of God. Man ought to know, first of all, the laws that will bring him up to the highest point of perfection, physically and mentally. Let not the telegraph, the electric light, the cloud-capped towers, and the gorgeous palaces tell of his genius and his power, and he be at the same time a dwarf and an invalid. Let him be, as God intended, in beauty and perfection of his being the crowning glory of all.

DR. S. A. KNOFF, of Los Angeles: Mr. President, I feel highly honored to be called upon in such a distinguished audience. I have little to offer, because Dr. Hitchcock has covered the ground so fully. I only wish to state that I am highly encouraged. I will tell you why. Ten years ago, when just from college, I made the first attempt, in the Los Angeles Medical Society, to read a paper on hygiene. The subject was, "Dress Reform, and its Relation to Medicine." As a young man I read it with palpitation of the heart. When our distinguished President of the Medical Society, who has now risen to the honor of being President of the State Medical Society (I refer to my distinguished teacher, Professor Wills) called upon certain distinguished gynecologists to open the discussion, they said they had not anything to say in regard to corset dress reform and medicine. Now, you can see how encouraged I feel when I hear this evening Dr. Hitchcock speak with enthusiasm on hygiene and exercise; and although he has not mentioned the corset, I know he is, in his heart of hearts, very much against it.

In regard to sanitariums, I have nothing to offer. The little work I have done has been published in the little synopsis which appeared in the New York Medical Journal. The importance of pure air has been sufficiently discussed this evening. There is nothing to offer. I would have some objections to make to the remarks, but time is advancing. I do not agree entirely with Dr. Norman Bridge, I must say. He has made some statements which I cannot subscribe to. Nevertheless, the importance of treating our consumptives with pure air, and paying great attention—most attention, I may say—to hygiene and diet, seems very plausible to me. During my experience as a young physician in Southern California, when I commenced to practice, I saw a good many consumptives; when I went to Europe I saw a good many more, and almost all treatments which have been applied up to date I have seen applied in the hospitals of Europe. I do not believe there is a medicine in the pharmacopia which has not been applied for the treatment of tuberculosis. They have all had equal results. When the patients had advanced far enough they all died, and they all died very shortly after

coming to the hospital. The attempt to cure patients in a general hospital is an absolute failure. When I began here as an assistant in the county hospital, I had not seen any cured; I had not seen a patient cured in the hospitals of Berlin, Paris, or Vienna. It is true they came, sometimes in advanced stages, and sometimes, and not infrequently, when they had just about passed the incipient stage, between the first and the last stage. Now, while I am convinced that if those people, instead of returning after six months to the hospital, had been treated properly, with good air and good food, they would never have returned; but they are bound to return to die there. It will cost the State just as much in the end as if, instead of curing the patient in the general hospital, she had erected a sanitarium. You all know of a sanitarium that is doing a grand work. The statistics of Saranac Lake are better than those in Europe. It is true they only take there incipient cases, not very far advanced; but, out of one hundred and fifty patients, to turn out twenty-five to thirty cured, and just as many relatively cured, is certainly a very remarkable thing. If you want to know how they treat patients there—air and food. There you have the whole philosophy. The institution is supported by charitable contributions. The actual cost for a patient is \$7 per week. The patients pay \$5, and the difference is made up by these charitable contributions. Dr. Davisson asked me the other day to try to interest some physicians here in a sanitarium. I have tried to do it, and they are all very enthusiastic about it; but what is needed here more than a sanitarium for paying patients is a sanitarium for poor patients. You have the county hospital here, and it expends a great deal of money on consumptives. They all go there to die. The cost would not be much greater in a sanitarium. It could be built in a very economical way, and the expense would not be as much as at Saranac Lake. We don't need the great expense of fuel. I have made a calculation that patients could be treated here for \$4 per week, and they would have a chance of being cured. The more patients we have, the more economy. The profession of the State of California should try to unite and build a sanitarium for the poor. I am sure the State Board of Health, and our distinguished President, very much desire that something of that kind should be done.

PUBLIC HYGIENE.

By J. R. LAINE, M.D., of Sacramento, Secretary State Board of Health.

The French term *hygiene* means that department of medical science which relates to the preservation of health and to the rules or regulations the observance of which tend to promote health. The term is derived from the name of one of the four daughters of Æsculapius, god of medicine. She was called Hygeia, and was represented on monuments as a young woman holding a serpent in one hand and in the other a cup, out of which the serpent drank. Her statues sometimes represented her with a veil. By some authors, she is regarded as identical with Minerva. The Greeks, as well as more ancient peoples, recognized that while the means for the preservation and promotion of health sprang from medical art or science, it was, nevertheless, a separate department from the curative or healing art. The imaginative

Greek clothed a bare fact in graceful metaphor. Medical art was embodied and deified in Æsculapius, son of Apollo, as god of medicine, while his daughter Hygeia was deified as the goddess of health. This would show that they understood medical practice to look to the healing, medication, and care of the sick, while the art of promoting and maintaining health, as typified in Hygeia, the daughter of the god of medicine, deified, as a separate and potential celestial entity, as goddess of health, would indicate a full appreciation of qualities and powers materially different from those of her illustrious sire. Both Æsculapius and Hygeia were represented with serpents. Serpents were particularly sacred to them, because they were the symbols of prudence and foresight—qualities so necessary in the physician. To the instructed Greek, the god and goddess were the symbols merely of the divisions of a branch or department of learning. Learning, however, as in more ancient nations, was necessarily confined to the few, and those few were mostly in the priesthood. It followed that the application of remedies was often associated with priestly functions. The formulated rules for maintaining and promoting health were, of necessity, made a part of the religious observances of the people; otherwise, they could not be enforced.

The great law-giver of the Jews recognized this fact most clearly. Under exceptional circumstances, after escape from the fate of the male infants of his race, he obtained the learning of the Egyptian court, and became an adept in the necromancy and mysteries of that ancient and subtle people. Moses possessed the qualities of a great leader. Brought up as an equal in a court where pride was a virtue; of alien blood; one of a despised and enslaved race; keen, receptive, bold, and unscrupulous, with the tireless mental activity that has everywhere characterized his race, he scrupled at nothing to accomplish the delivery of his people from Egyptian bondage and to found a dynasty of his own. His vigorous methods finally prevailed over the weak and vacillating mind of the Pharaoh, and he led his people across the Red Sea into the land of milk and honey—a grazing country—where he gave them his laws and established his ceremonials. He was especially desirous that they should believe in God, but it was equally important for his purpose that God should give the law through him. He knew it to be necessary to their very existence that the laws should be obeyed. A degraded people, for hundreds of years slaves to Egypt, corrupted by contact with the debased, weaned from the ancient faith, made skeptical by long suffering, brought to freedom without knowledge of its necessary restrictions, unused to any law but the will of the taskmaster, it is no marvel that they frequently reverted to the license of savagery. Moses knew that, in order to maintain them as a separate people, certain distinctive observances must be imposed; and to preserve their lives from the pestilences that periodically swept over Asia, and to limit and prevent the infectious and contagious diseases of other tribes from destroying them, it was necessary to impose the most rigid hygienic rules. Rules for the lying-in chamber, for the menstrual period, for eating and drinking, for the inspection of persons and habitations, for leprosy, for the scraping of walls of buildings, for the tearing down of buildings that held contagion, for bathing for disease, for treatment of plunder in war, for severe punishment for unnatural sexual relation, for circumcision, for fasts and feasts, are all in the nature of police regulation,

and as such have a purely hygienic or sanitary significance. To have argued the necessity of such rules to an illiterate people with idolatrous tendencies would have been as fatal as to permit them to escape punishment for their violation when he had power to inflict it. Moses was free from such weakness. Those who violated his rules were punished with death. He dealt the most rigorous severity for infractions that would scarcely be noticed in a modern police court. Yet, all of his hygienic and other police regulations were invested in religious observance and significance. It had been so on the Nile, where he had learned them, and had been so among those old nations that fade back beyond the written history of man.

The Greek mind, acute, quick, light, and fanciful, required no such arguments for the reception of an idea. To them, medicine was at times a necessity, and good health was always to be desired. It was not necessary to impose on them the laws of health as a religious observance, with a death penalty. Their environment and isolation might, in a measure, account for that. They had never been enslaved. They had little reverence for abstract matters. They were a practical people, who clothed their lessons in metaphor and graceful symbolisms. Hygeia was the symbol of private and public health. Her statues in different localities would show that health rules were observed in those places. That some people should worship the statue instead of obeying the laws of health was to be expected, yet to worship at the shrine of Venus or of Bacchus would have been absurd to the Greek if it had meant worship of the symbol or the statue. But observing the laws of health was not as agreeable as worshipping at the shrine of Venus or of Bacchus, and an appeal with offerings to Hygeia was not uncommon.

In our time, we accept the symbols of the Greek. We cannot improve on them. They appeal to the imagination. Instead of being the crude and fanciful conceptions of the pagan mind, they are beautiful expressions of the harmonious relations existing between two departments of learning, one emanating from the other; the daughter from the sire, the goddess from the god, implying obedience to parental authority, though of equal rank and station in their realms.

The physician has especial care of the sick with reference to the cure of disease or of securing temporary ease for the suffering. He is also called upon to answer questions as to the cause of disease and as to the best means of destroying, avoiding, or removing such causes. The treatment of a case or of a class of cases of disease may be purely hygienic. The prescription or the surgical operation must often be supplemented by advice as to air, food, clothing, residence, water, etc., and the giving of such advice in such a manner as to secure the compliance and obedience of the patient is of the greatest importance. The observance of the mode of life recommended by the physician is of far greater value than the prescription, which is often merely a reminder of the regimen prescribed.

The relation of the physician to the public at large is increased in importance as the population increases. He is brought in daily contact with legally constituted authorities, such as boards of health, registrars of vital statistics, health officers, and coroners, and he is frequently called into court to testify as an expert in matters relating to public health. The more eminent he becomes in his profession, the more will he be called upon to act as an advisor in public affairs looking to legis-

lation, not only in his city and county, but also in his State and nation; and he is held responsible, in a degree, for the position he takes and the advice he gives in regard to public health matters. This is true whether his attitude on these questions be active or passive, for silence will mean that, in his opinion, no necessity exists for action or change. There seems to be a feeling of distrust on the part of the general profession with reference to the advisability or even possibility of increasing the public health to such a degree as to diminish the rate of mortality. The physician is apt to view what he is personally engaged in as most important, yet he recognizes the necessity of pure air, pure water, pure food, and correct habits. He knows that, to obtain pure air and pure water, sewage must be gotten rid of, and that ventilation must be adequate; that, to obtain pure food, markets, slaughter-houses, dairies, and milk must be inspected. He consents to or advocates all of this, but retains an undefined distrust of public hygiene in its general sense.

The hysterical, exaggerated, and emotional statements and exhortations on what one shall eat, drink, and wear, and the awful penalties prophesied by rash and unauthorized writers, have had much to do in bringing the profession to this state of mind; nevertheless, none will deny that epidemics are prevented and controlled, that infections and contagious diseases are robbed of their terrors, by means purely hygienic, and that the term of life of the individual is increased.

There are many things relating to hygiene which are necessary to know, and many things that are so classified that it is merely necessary to know where to find them.

The etiology or genesis of disease has, from the earliest times, been the study of physicians, but not in special localities. But of late the general public have awakened to the importance of sanitary work, and the family physician is not infrequently asked for an opinion as to the healthfulness of a house or locality. He must be ready to give a known, probable, or suspected cause of disease, and also the best methods known to avoid, destroy, limit, or control it. The causation of disease, to illustrate, may be set down as heredity, impure water, impure air, occupation, intemperance, climate, food, habitation, clothing, sexual excesses, overwork, parasites, micro-organisms, contagia, overwork and exposure. This does not include mental causes, though they have a legitimate place in causation of disease. It is the custom of breeders of fine stock to select a sire and dam that possess the qualities of bone, wind, and disposition desirable to reproduce. But it is not often that the physician is asked to give advice as to a contemplated union where disease or hereditary predisposition exists on one or both sides, or where mental traits are known to exist that will prove fatal to happiness. Heredity of idiosyncrasy and of infirmity of temper or mental unsoundness should be a bar to marriage in a well-regulated family. Inherited syphilis should be a positive inhibitive reason.

The attention of physicians will be frequently called to the question of the water-supply of isolated houses, institutions, villages, towns, and cities. No one can determine, off hand, if water contains substances detrimental to health. It is also difficult to define in a definite hygienic sense, what is pure water. In the absence of positive evidence, it is sufficient to indicate the probability as to what suspected water contains. The water-borne diseases are cholera, typhoid fever, malarial fevers, and diarrhoeal complaints, and in instances where water drains

from grounds containing buried carcasses the water may be of the brightest quality as to appearance, but may engender various disorders not necessary to treat of at this time. Lead-poisoning may be produced from water. As formidable as cholera and typhoid fever are, they are nevertheless the most preventable of all diseases if pure water only is used. Malarial fevers may be contracted in other ways than by water, but water is a prolific cause of malarial diseases. Water taken from sources having the paludal germ, or water taken from wells in marshy places or regions known to be malarious, may be the cause of the disease.

Nothing in preventive medicine is better established than the fact that cholera and typhoid fever are conveyed by water oftener than by any other means. The germs are either deposited directly into the streams, or the rains wash them from the surface of the ground, or they reach the streams in the sewage of the towns, or percolate through loose soil from privies and cesspools, or pass in the same manner into wells from which water for drinking is used. Their existence and multiplication in the streams depend on the quantity of organic impurities already contained in the water, where these germs will multiply infinitely. This will illustrate the gravity of drinking water from streams in which a large quantity of municipal sewage is discharged. The water from such a stream may be used with little danger while it contains no pathogenic germs of disease, but let it be contaminated by cholera and typhoid fever, and the danger of drinking such river water, unless it be boiled, is extremely hazardous.

The possibility of contamination of river water alone, aside from the fact that disease germs are frequently conveyed by it, should lead reflecting men to seek elsewhere for municipal water-supplies. Water will seek its level, and everywhere the rivers are the natural sewers of terrestrial conformations. The expedients of farming sewage are available in an extremely limited sphere. It is necessary to obtain water from sources as much removed from the possibility of contamination from sewers as possible. While water from deep wells often contains undesirable inorganic salts, yet these are not always in quantities to be injurious to health; and such water frequently proves free from all objection. Such sources produce the ideal water-supply for municipalities, if obtained from such depths below impervious strata without faults that no surface contamination can reach them. Given such a water-supply and a system of drainage capable of quickly disposing of the sewage, and the town or city will reach the lowest death-rate from typhoid fever and a practical immunity from cholera during its prevalence. The examination of suspected water is not a simple matter and should be referred, when practicable, to a chemical expert; but the physician should have sufficient technical knowledge to enable him to appreciate the results reported by the chemist.

The subject of ventilation is fully as important as that of pure water. Malarial fevers are frequently contracted through the air as a medium of infection; but gaseous impurities in the air produce disease by reason of their offensiveness to smell rather than by conveying the germ. But such influences may lower the general standard of health in the individual, the family, or the community, so as to increase the susceptibility to any disease, and may bring about a variety of disorders. These causes may be termed effluvium nuisances. To avoid such nuisances there must be an efficient removal of household and municipi-

pal impurities. There must be no escape of gases and odors of decomposition in or near any human habitation. The subject of ventilation of houses and public buildings should be studied by the physician from a higher plane than that of providing merely for the requisite air space in rooms. The obtaining of fresh air through flues and registers, the regulation of the currents so as not to create draughts on the heads of the occupants in hospitals, schools, churches, theaters, halls, court-rooms, and private houses, should be seriously considered. The velocity of the current at the registers should be noted, as well as that in the flues. The habit of observation needs cultivation to a high degree to profitably inspect a public building from basement to garret in order to ascertain the source of contamination of the air. The plumbing may not be at fault when the pent-up air of rooms may contain an abnormal quantity of carbonic acid gas. It is not so simple a matter to provide adequate means for a renewal of air in a faultily constructed house. The evils of faulty ventilation are not always immediate. The results are frequently remote and obscure. Yet it certainly produces disease and shortens life. Diseases of the respiratory organs are favored and produced by insufficient ventilation. Practically speaking, the physician comes in relation to bad ventilation and disease-breeding effluvia in the court-room to give evidence; and, to acquit himself with credit, he should possess ready information and data sufficient to enable him to form and give a positive opinion without hesitation. Without such data and information, his cross-examination may show that the attorney has him at a disadvantage, by reason of special preparation.

Climate, or the sum of meteorological influences, such as air, water, soil, temperature, humidity, altitude, and wind, is a never-ending subject of inquiry to the physician from sick and well. The literature on the subject is extensive, but no rule can be said to be positively established with reference to the value of climate on longevity. Man adapts himself readily to all climates. How far the physician may go in his eulogy of special climates or localities, with reference to their therapeutical value and health-conserving tendencies, should depend on his special knowledge of the subject. There can be no precise rule.

With reference to food, space will not permit that more shall be touched upon than a bare approval of the pure-food law enacted by the Legislature of 1895, and the necessity of slaughter-house and dairy inspection. The danger to infants from using milk from tuberculous cows is not as fully appreciated as it will be. All vendors of milk in towns should be licensed, and no license should be given to sellers of milk from dairies that fail to conform to the standard required by the health authorities of the town. Uncleanliness about the methods of handling the milk or the milking of sick or tuberculous cows should be causes for rejecting or revoking a license. Pure water for cows to drink should also be an imperative requirement. I may add that the physician should understand cookery, so as to be able to give instructions as to the preparation of dietary articles, not only for the sick, but also for persons and families in health. It is no less his calling to promote and maintain health than to medicate and feed the sick.

It is very well understood at the present time that cholera and typhoid fever are to be managed by purely sanitary regulations. Quarantine is a temporary expedient and cannot alone be depended on. It is necessary only that none but boiled water be drunk and recently cooked food eaten

to practically escape these pests. Regulations looking to the prevention of tuberculosis by limiting the spread of the germ are receiving careful attention. The improved therapeutic agents for tuberculosis and diphtheria should be supplemented by the most painstaking hygienic precautions.

It may be well to touch upon overwork mentally and physically, and upon the results leading to what may be called mental causes of disease. The physician is often consulted by the victim of overwork and worry. The patient may be the hurried business man, or the pale student, or the enemic child at school. It may be the plain housewife whose physical exhaustion has reached its limit. There may have been mental strain or physical strain, or both, where the tension has been maintained so long that the delicate nervous machinery no longer coördinates and there is a want of harmony. The instrument is not in tune. No medication is equal to rest in such cases of mental and physical insolvency. But such rest may be merely change of vocation and scene. To consign the active mentality to the condition of stasis is to immure it in a dungeon of despair, a prey to horrible suspense. Let the scene be changed, and let the mind be occupied without the need of effort. A change of pursuit or occupation, with change of scene or environment, will often accomplish what no kind of therapeutic means can do.

The prevention of disease deserves the most careful study. Aside from those hygienic rules which imply cleanliness and the observance of the general laws of health, vaccination and re-vaccination are to be enjoined with never varying reiteration. All cases of smallpox should be given publicity. Such publicity forces prompt public measures to check the spread of the contagion. The policy of concealment is the most expensive that can be pursued. It favors the spread of the disease and exposes the innocent to danger. Through ignorance of its presence, no action is taken to check its spread or to stamp it out. Vaccination confers the only immunity. With reference to diphtheria, aside from the well-known sanitary precautions, the means for immunizing those who have been exposed to diphtheria is to inject an immunizing dose of diphtheria antitoxine into each person exposed. This will result in immunity of a month's duration or thereabout. This remedy is supplied by the State in California, and may be used boldly, without fear of evil results. The stipulation should be that it shall be used as soon as the diagnosis is verified. It is better to give the patient the benefit of the doubt and use the antitoxine early.

The relation of the physician to public health is in a measure forced by public opinion. Census reports and the means for the protection of the public health may be regarded as a fair test of modern civilization. When the individual begins to take precautions to preserve his health, he may be set down as suffering from some imprudence in the past. Communities or aggregations of individuals are measured by the same rule. Communities and cities where they reach civilization to a sufficient degree devise measures for obtaining good and sufficient water, and pure air. To obtain pure air, there must be a quick disposal of sewage.

When disease, by current rumor, is said to prevail in a certain locality more than in others, the physician is called upon to state a probable or known reason for its existence, and to suggest means, however imperfect and inadequate, to cause its abatement. Thus he is forced by the public to express an opinion, whether he desires to do so or not; for the

public invest him with a certain degree of superiority by reason of his real or fancied familiarity with the causes of disease. This leads the community to a tabulation of the causes of mortality, and the obtaining of the death-rate from any one or from all causes. Comparisons are instituted between localities and cities and States; between urban and suburban localities, and between those engaged in different pursuits, occupations, and callings, involving varied habits of life imposed by reason of such occupations. Upon such observations, public hygiene is founded. This is preventive or State medicine. The gathering of vital statistics is one of the labors involved in State medicine. On the reliability of the statistical information obtained from the medical profession depends the value of the work. The age, sex, occupation, and nativity of deceased, a full report of all births, and the registration of all marriages go to make up the vital statistics of a community. The efficiency of public health service must depend largely upon the relations which it holds to the general medical profession. There must be confidence in health officials from the profession, regardless of any political or other consideration, or their efforts cannot reach their desired plane. A certain coöperation or compliance on the part of the profession is necessary. In California, the physician is compelled to report deaths on blanks supplied for that purpose, and births on another, and a penalty, of not less than \$50 fine, for violation of the statute is imposed. Physicians do not hesitate to comply with the first, but openly violate the law with reference to reporting births. This violation of the law does not result from any personal hostility to health officials, but seems to emanate from a pecuniary consideration. They think they should be paid for it. Many medical men evince a determined hostility to municipal regulations requiring notification of the existence of contagious and infectious diseases, holding that such notification should be made by the householder. The strength of any such opposition to necessary rules and laws must be based on the idea that it is unjust for the State to exact services without remuneration. This idea is reinforced by the contention that the report of a birth requires no expert knowledge, but may be made as easily by the householder as by the physician. In those States where the registration of the physicians involves the granting of a license to practice, the State may demand a full report of death from the medical man last in attendance, without compensation. The State may demand more, the protection involved in his license by the law against unauthorized pretenders being in the nature of value received.

Much greater difficulties are presented in the matter of the compulsory notification of contagious and infectious diseases to the health office. The placing of a placard is done by the health authorities, but the notice is required of the physician who makes the diagnosis. Some physicians contend that such requirement is in the nature of an exaction of service without compensation. They consent to making an announcement of the diagnosis to the householder, whom they deem the proper person to report to the health office. It will be seen, however, that the report of the average householder would be unauthorized and hearsay. The matter of placing on the front door of a citizen a placard bearing the ominous words "smallpox," "diphtheria," "scarlatina," "cholera," or "yellow fever" is of too serious a nature to permit it to be done except under the ægis of authoritative notification by a qualified physician.

Otherwise, irreparable injury might be done by the playful malice of a vagabond whose vicious nature led him to denounce such person by a mendacious report. The compulsory notification by physicians must stand, even if, in a measure, unjust. Civilization is made up of restrictions, and the State is not asking too much when it requires a prompt notice of contagious and infectious diseases. The physician who cavils at reporting such cases, on cards supplied for that purpose, has a bent of mind that may enable him to prosper, but that unfits him for public service. He who never gives except when he receives an equivalent excites no admiration for his idiosyncrasy.

The problems of practical hygiene require special training and special knowledge on the part of those who have to deal with them. It is no self-disparagement to acknowledge a lack of precise knowledge on this or any other department of human knowledge. Physicians should and do seek to place capable and responsible men on local and State boards of health, and these legally constituted sanitary authorities receive the support from the profession which their public services justify. But the body of intelligent physicians in the municipality or the State is the tribunal by which the sanitary official is to be judged. The value of such judgment will depend largely on their appreciation of the peculiar difficulties with which health officials have to contend. The profession is thus largely accountable for the laches or incompetency of health officials. It is always in the power of the local board of health to appoint a vigorous and capable health officer. If they fail to do so, the public holds them responsible for the incompetency of the incumbent. If the health officials of the State or nation prove weak and incompetent to deal with public questions involving great interests, the profession of which they are members is held to a degree of responsibility which it cannot evade by a disclaimer of voice in their appointment to place. A member of a family may go wrong, but the entire family bears the burden of obloquy. It is therefore necessary that health officers should be chosen for their special fitness for the end to be attained, and that they should receive from the profession a full, free, and unreserved support in all well-defined endeavors to promote the public health. There are so few rewards for sanitary services that there need be no professional rivalry engendered. Public approbation of service in this department brings no increase in private practice. Public service is a destroyer of medical practice. There can be no reason, then, for a failure to approve and support health officials in the legitimate exercise of their public functions. This is often a thankless task, but, as a recognized department of a noble calling, we must accord to it that approval of the authority vested in it by the State, and hold it in honor and esteem as a member of our professional household, the daughter of medical science.

DR. W. W. STUDHAM, of Los Angeles: Mr. President, Ladies and Gentlemen, I did not expect to open the discussion on this paper. I was looking for one later on. I don't know that there is very much to be said in addition to what the Doctor has already outlined. I was very much interested in the paper, and have learned, I think, a good many things with reference to the question. I have been interested especially in the modes and methods which the paper has pointed out for the correction of a great many things which have occurred in the direct line of sanitation, so far as duties of health officers are concerned. In a great

many papers, in fact, in nearly all of them, we have methods laid down, but no method of a practical character which will enable any one to take hold of the subject and carry it out according to any special method which can be laid before the entire public. In order to get any method of sanitation into operation, it is necessary, to a greater or less extent, to cultivate the public mind up to the point where they will accept some things. In the direct line of the duties which devolve upon the health officer and his duties in a sanitary line—and it is necessary in a hygienic line as well—there is one of two ways it has to be done, and generally the second way is the way. It must be done according to law. There are certain laws for certain things, and people will argue those propositions with you in a way that the simple question just simply devolves upon complying with the law in the case. The public mind is not educated, but they simply think you are working a hardship. Following along on the line of the work, I think the Doctor has covered the subject thoroughly, and I have been more interested in what has been said than to prepare any remarks in the way of discussion.

MANUAL TRAINING AND HEALTH.

PROF. CHARLES H. KEYES, of Pasadena: I have no paper, so I have just a little the advantage of my brethren who are better prepared. I can stop when I think the danger point is reached.

Many years ago, as I went into the business of education, I determined that I would never lose an opportunity, not simply to attend conventions of educators, but also the conventions of men and women who were in distinctively different lines of activity; and as I look back over the years that have gone, I am constrained to confess that some of the greatest advantages, some of the best reinforcements that have come to my thoughts in my own line of work, have come from attending gatherings of members of other professions.

I congratulate myself that it has been my privilege to be here this evening to listen to the discussions that have taken place; to realize that the medical profession, at least, has come to the conclusion that it is time to turn the mind of scientific inquiry toward the normal body. In the nature of things in the development of medical science, the young man, and I may venture to say in this day the young woman, has her inquiry constantly upon the abnormal body. If there be any reason for the being of such organizations as the one under whose auspices we are gathered this evening; if there be any excuse for the discussion in public of such themes as I find upon this program; if there be any excuse for the presentation of such a theme as that announced for myself, it can only be that we have come to the conclusion that it is time now to give a little thought to the normal; that long enough the abnormal has absorbed our attention.

I am glad to feel, with my brother Bridge, that the medical profession realizes that it is necessary that this gospel of hygiene be preached by somebody who can speak as with the voice of authority, as only a man trained in the science and art of medicine can. You know that is an old, old story—that of the school teacher, and he wonders why in all these years of harping he has not accomplished anything.

The average schoolmaster, on the ventilation question, is in largely the condition of the ventilation crank of whom the story is told—perhaps you have all heard it, but I am going to inflict it again, because it turns my point. You remember the old fellow who was sure that the only thing that was needed to regenerate the world physically and morally was to get it in the way of breathing fresh air. He had been harping upon that subject with a young man who traveled with him across the continent, and they were stowed away in one of those stuffy bedrooms, which is worse than sleeping under the bed in that Pullman car, or on the top shelf, whichever one you may have. The old fellow, as they went to bed to occupy the same couch, complained about the condition of the atmosphere, and said, "We will have to have some fresh air, or I will die; get up and see if you can open the window." The young man groped around and tried here and there, and said, "I can't open a thing; everything is fastened down." He said, "Break a window, then." "But there is not anything to break it with." "Well, take my boot and break it." The young man seized the boot and approached the glass and banged away, and the old man said, "There, that is something like it; now, I can sleep." He slept the sleep of the blissful, and the next morning he awoke to find a piece of furniture, or something like that, standing in the corner of the room up against the front wall, with one glass broken out. The average schoolmaster is just such a crank as that.

In every profession, men get credit for a great many things they don't know, and, if you will pardon me, you of the medical profession get a large credit for some things you don't know as well as for the great many things you do know. Whether you know it or not, the laity conclude that you know all about this business of hygiene, that you know all about the real value of ventilation, of hygienic exercise and practice. You know how far that is wide of the fact, or how accurate it is, but that is immaterial to the point that I desire to make. As long as it is in the public mind that you are vested with the only voice of authority on this question, there devolves upon you the duty of reinforcing this lesson, not simply in State medical conventions, but among the laity. The men and women who come to you with weakly, broken-down bodies are not the only ones who need to learn this lesson; but, in the interest of humanity, whose mission it is your duty to serve, this gospel should be preached by the physician who believes the upbuilding of a noble race of men and women to be a part of his calling.

I was glad to know that my friends who preceded me were all agreed that in this matter—and you may wonder where the medical training in health comes in, but it is coming right along—it was high time that in education there must be some attention paid to training bodies. We have harped on those old truisms about the healthy mind and the healthy body so long that it has become absolute cant, but in practice we have no faith in it at all; and we are beginning to cant in education. Let me illustrate. You hear everywhere that the business of education is to train young men and women to govern themselves, to be self-governing citizens. Now stop, friends, and ask yourselves, what is the one place where a young man is never permitted to govern himself? It is in school. It is the only place. Yet we teachers and citizens say we believe that is the mission of the school. That is all cant. We don't believe in it yet. We think we do, and by and by we will come to

believe in it. We will have the courage to practice according to our faith. Right opposite that cant I put this other one: We have been saying we believe in sound minds as being possible only in healthy bodies, and we have absolutely ignored all training of bodies. While there is a little bit of gymnastics for relief, or because it is the fad to talk about gymnasiums in schools, how many people are ready to go down in their pockets and provide the money for the only intelligent gymnasiums that ought to be connected with the school—a gymnasium that has at its head a man who is able to take account of stock? What would we think of a teacher who undertook to teach mathematics who could not, when his class came to him, take an account of stock on hand and discover what they knew about algebra or trigonometry or the calculus? The first thing to do is to find the exact condition in which he finds that class. It is not the theory that he is troubled with, but the exact condition that confronts him so far as the mathematical condition of that class is concerned.

A gymnasium is worse than dangerous if it is managed without somebody at its head who is able to see just exactly what is the condition. What may be my boy's meat may be your boy's poison. What may be good for this girl may be utterly destructive of the other girl. I have said, when I have gone about this country trying to find some man who would go down in his pocket, when he asked me what kind of a gymnasium I wanted, "I want no gymnasium until I can have the wherewithal to pay a man or woman, or a man and woman, who shall take every young man or young woman who comes to that gymnasium and make a thorough physical examination"—and just here will you pardon me, and I speak as a layman, if I undertake to make a suggestion to you, learned in your calling, of how you can help my calling, how you can help humanity?

In the day when psychology was the science that hung up there in the clouds; the science at whose altar men could only worship when they got away up in the mists; when it was metaphysics, whether Scotch or German metaphysics; the physician who had to deal with real things said psychology. But psychology has been born anew within the last fifteen or twenty years. There is a science which recognizes that our friend is speaking in the language of science that men mistake a torpid liver for a quickened conscience. There is now a realization that it is all folly to set in operation a mind independent of the body in which it resides. It is equal folly to talk about attaining the best results in the treatment of broken bodies without recognizing that those broken bodies are constantly dominated and interfered with by worried minds. The medical course of the future must give more attention to psychology, to that psychology which bears the interminable name of physiological psychology, the only psychology that is ever to live, and the only psychology that could have lived, and I hope that the day is coming when every physician will not only know upon what plan a boy is built, muscularly, anatomically, generally what his nervous system is as it is put up, but also that he will recognize that "the highest study of mankind is man." I want the physician of the future to know boys infinitely better than I hope to know them. He ought to know them as much better than he knows them to-day as the average teacher knows them better than the average good physician. I look back to the day when the preachers where the physicians and teachers. It was not a bad combination. It

may not be needed in your business, but I tell you the man or woman who is to train the young must by and by be a man who can draw upon all those springs of knowledge, and until that day comes, if we are to do wisely in the matter of educating young people, it must be because you will keep your eye on us and stand ready to help us in this matter, and because you yourselves will recognize that not only must medicine be studied, not only must hygiene be studied, but also humanity must be studied, and humanity in its normal as well as in its abnormal.

Speaking of the class of abnormals, we were told that at Glen Ellen it was noticeable that they did not walk well. I always say to men and women who are anxious to know more about the business of teaching, "You ought never to fail to improve a chance to visit a fool school." The best educational clinic in the world is a well-conducted fool school. If you go into one of them, what is about the first thing you find them doing? Here is this contrivance that you call a ladder, and the boy comes in so bereft of intellect, or with an intellect so undeveloped, that he cannot speak. He shuffles his feet, and they have him step over this ladder that is laid down there. What does it all mean? That science has discovered that there is such a close connection between the defective intellect and the bungling, clumsy, weakly motor energy that we discover it in another way: manual training came that way. Every child who is off-color intellectually will display it more quickly in his defective motor activities, in his defects of muscular application, than he will in other ways. To put it more completely, the boy who is a little off-color intellectually, who is not quite up to the standard, may get through the class in English, or may get through the class in geography, and not disclose it half as quickly as he will in the workshop of the manual training school. In the course of the last five or six years it has been my privilege to see ten or twelve hundred boys go into the manual training school. Among that number there come to my mind five or six of whom the fact is, whether it be charitable or not, they were under the average in point of intelligence; and I take it they were sent to us with the feeling that the ordinary school had no opportunity for drawing out anything, if there was anything in those young souls, and that possibly the manual training school might do it. The reports of the defects in intellectual makeup would come more quickly from the teachers in the manual processes than they would come from teachers in geography or English, or history, even; and the boy who was so close to the line that it took a year of study to determine whether it was true that he was a little under the normal, gave the most certain evidence in the manual training processes. In other words, motor activities disclose the abnormality, weakness of intellect, quicker than the traditional processes of the school-room. But it is not on this score that it seems to me that the claim of the manual training school as a health-reinforcing agent must be made. Everybody realizes that a condition of health is one that means a condition of functional activity; that means exercise. The worst kind of exercise is the exercise that is taken for exercise's sake. When the man goes out and takes a walk for the sake of walking, with the conviction that he needs it for exercise, compare the results with the fellow who goes out and walks because he is after a gray squirrel that he is going to shoot; he has no thought of the walk, but he is out to shoot. And the man who

gets into his shell and rows just because he needs exercise, compare the result—and that may be a good result—with the work of the man who gets into his boat and rows up the river to meet a friend or goes upon the river with some other definite purpose in mind than merely getting exercise out of the rowing. Compare, if you please, with all its vices, the consequences of legitimate football—there is such a thing as legitimate football—with mere standing and hammering a bag for the sake of exercise. Anybody who has ever been through it knows that the one not only gives muscle, power, and grace, but it also gives moral health; and, gentlemen, you know that there is a lack of health that is not disclosed to either the biologist or the physician, unless the physician is not only biologist but also a student of the mind as well.

Any exercise, then, to be of the best value, must not be taken for the sake of the exercise. The exercise must not be an end in itself, but simply an incident. Any exercise to be most beneficial must be regularly and systematically taken. Now, you know how hard it is for you who may appreciate the value of exercise to make the good resolution that you will take your exercise regularly, and do it, unless you are wise enough to hedge yourself in by making your exercise an incident to some pursuit that is a passion with you, some pursuit that is a delight.

If I may turn to a personal illustration: I overheard two men say, when I was seventeen years old, while I lay on the hay up in the loft—it was the day after commencement at the academy, and I was getting ready to go to college. Those men had come over to commencement in the academy, and they had gone out to look at the horses in the barn; they were visiting at the house, being friends of the family, and they deplored the fact that my father, a poor man with five boys to rear, should spend his money to educate his boy and fit him for a walnut overcoat. I remember the peculiar expression. They said "Look at him; he is six feet two inches tall; he weighs one hundred and fifteen pounds; he is round-shouldered as a bed-bug, and he is hollow-chested, and he is squeaky-voiced; we will come back and bury him within a year." I tell you, *Les Misérables*, which I was reading, had no more charm for me that afternoon. I was thoroughly frightened. • I did not know what to do. I did not want to tell my father and mother about it; I did not dare to go to the doctor about it, and in despair I said, "Well, if I am going to die, I am going to have a right good time while I am here." And what do you think I picked out as the means of having a good time? I said, "I am going to play all the baseball that I can." I had begun to like it a little, then; and I took to baseball as the average man does to brandy to drown his sorrows in oblivion, and the baseball led to a little rowing and boating, until it came to pursuing athletic sports as a passion, because they gave me delight. I know that no gymnasium in the world, and no physician at the head of it, could ever have done for me in three years what the pursuit of athletics—it happened that I had some wise guidance in it—did. But I did not take my exercise for the sake of exercise. That is the trouble with the average gymnasium. Until we turn our attention to getting such material and processes into the gymnasium that we can put the fun of it in the boy's mind, and not have him do something because he is a little weak there or ought to be brought out here, and do it as he takes a dose of medicine, let us dis-

cover that, and not tell him, "Do this because you are weak in the back," but try to put a zest into it.

A friend of mine says the summation of good teaching is to say, "Johnny, there is something interesting; go for it," and if you say that so eloquently that Johnny does go for it, you have done the highest teaching in the world. And so in our gymnasiums we must do that.

The manual training school in this home class first of all sends the young man to a given business at a certain hour every day, and keeps him at it regularly. This matter of systematic exercise is settled every day in the year. In the next place, it is taking all notion of exercise out. The young man or young woman enters the shop, or laboratory, or study, with no thought that he or she is going for exercise; but if the exercise is rightly planned—and oh, we have a mighty struggle in this day when people think of manual training here as solely a means of putting a little bit of dexterity into a hand whereby a boy may a little easier earn a better living! I say education is a good thing, but trained education for the masses must be more than that. We have no right to take your boy and put him into a school that you call a manual training school and give him a trade before you have discovered him—before he has discovered himself. Manual training for the masses must be justified on some higher grounds, and one of the higher grounds will be as a sanitary measure. It is going to give him regular and systematic exercise. It must give him exercise that is planned with reference to the fact that he has a two-sided body, with a right side and a left side to it; and any manual training that simply develops that side and that arm, and forgets this hand and this side, is no manual training that can justify itself with the great masses of people in all stages and conditions of society here in America. But; best of all, is the fact that it conceals the purpose so far as the sanitary effect is concerned. It is the highest art, Horace tells us, to conceal our art. It is when this man so walks the boards that he forgets that he is Edwin Booth, American playwright, whose business it is to thrill these audiences, whose business it is to find the evidence of that in the fat box-office receipts; when he becomes so thoroughly imbued with the character he presents that not Edwin Booth, but the gloomy Prince of Denmark walks the board; then it is that the climax of his art is disclosed. And so it is in everything. The highest purpose of any art is obtained when the purpose of the art is not displayed. With reference to health, it gives him the exercise and it conceals the purpose. If you were to ask the two or three hundred boys and girls who constitute the student body at Throop how many of them were compelled to take exercise, "Do they compel you to take any gymnastics?" they will tell you—and we are sorry to have to admit that we have not money enough for a gymnasium, and we have not it. It is not because we do not appreciate it—they would say, "No; we have no exercise to take." But, friends, do you know we cannot get a football team or a baseball team to live and flourish, and I don't know why. I am not so old yet but I can play baseball or football, and I love it just as well as I did when I was eighteen; and when my boys do play I go with them, not as a matter of duty solely. I have not to screw myself up to a very high plane of duty to go out and watch the boys, but I go because I enjoy it and because I have a good time; and with all that kind of encouragement from a man who is as brimful of interest and enthusiasm

in them as I am, I sometimes wonder why I cannot make those things live, but I have come to the conclusion why. I know that boys cannot be decently educated without intense athletics, vigorous athletics. This nice, grace-begetting business that we have presented as gymnastics so many times may do for weaklings and young children and girls, but boys from twelve to eighteen years of age need vigorous athletics if you are going to have clean, moral men. If you are going to have men to whom social purity will mean anything; if you are going to have men to whom personal cleanliness will mean anything, you want vigorous athletics. I have come to the conclusion that we have given our boy the vigorous athletics in the shop, and when he has swung that hammer and worked at those machines and put in his hour and a half every day for a week, he is not as brimful of the desire to get out and kick something as the boy who has been on the benches all day long. In this day when we find even physicians ready to cry out against football with all its abuses—and there are a thousand of them—I wish they knew a greater abuse than football. I wish they knew how great a crime it is to keep a growing boy in the average school-room processes from nine in the morning until four in the afternoon. I wish they would stand up, before they protest against football, in which the boy does kick out some of the criminality that has been stewed into him during those long hours of confinement, and say, "Let us cut the school day right in two, if we cannot have some manual training in it; if we cannot have some intelligently managed gymnastics that will take an hour and a half off of the school day, let us cut it in two," and what will be the result? We will do more for our boys in one half-day of intense, intelligent teaching, if we turn them loose the other half, than we will under the present condition. And when you shall give him the one half of the present school day, with intense, intelligent, vigorous teaching, and give him the other half in the gymnasium that you gentlemen have pictured to-night—in the gymnasium that ought to be the attachment of every school in the land—it will be no paradox that he will master more in every one of those half-days given to the traditional subjects of the school than to-day he is mastering in the whole day.

You know that a given line of exercise that may be for the development of this muscle may be continued a given number of times, each time adding the new strength that is being put in; but there comes a time when that push doesn't put in any more vigor, but tears down something that you had before, and you can go on until the exercise will tear down and destroy all that it built up at first. The same thing is true of the processes of the school-room to-day. When they talk about not having money for gymnasiums, we had better spend less money on fewer hours of service in the traditional lines and have some money for these gymnasiums. The child that grows up a good-natured, healthy, sweet-tempered ignoramus will make a safer citizen for California than one who grows up with his head full of theories, with all the wisdom of the pedant or the philosopher, and the crippled, broken body, in which there is found that torpid liver that he almost invariably does mistake for an enlightened conscience.

I am one of those who believe that this matter of sanitation is so important that I would very highly value a law that would compel my friend Southard, and others like him, to give of their time to the public by going into the schools and examining the eyes of every child who

goes there. How many of us stop to realize that a very large percentage of the children in this country who have weak eyes and defective eyes at fifteen or sixteen years of age have them solely through our neglect in this line. A boy goes into a school with a good right eye and a good left eye, but they were not mates. That is not remarkable. We don't think it strange, for you and I have a pair of feet that are not mates, or a pair of hands that are not mates, or arms that are not mates. I suppose, in the strict sense of the term there is not a man here who has a pair of hands that are mates. You physicians could come nearer it than most people. That hand is worth half a dozen of this one, as the average man is put up, and we think it strange that any one should suggest that eyes are not mates. Here is a right eye that is focused here, and another one there, and you try to work them both together, and what is the result. By and by you have a pair of eyes that are mates, but neither one is good for anything. You had two good eyes, not mates, at first, and you have two perfectly mated, and both are bad. The physical faculty that we use more than any other is the visual faculty.

I recognize that my theme was manual training and sanitation. Our friend, the President, could put his hand down there on something, and it will tell him more than my eyes and both my hands will tell me. What has he been doing? He has been educating that hand of his. His profession has exploded the old fallacy that men learn of the outside world chiefly through the eyes. He has been taught that it was that wonderful faculty that educated the eye to begin with, and for him his hand is another pair of eyes. The manual training school says that not simply the physician is entitled to this kind of training, but also every boy should have that other pair of eyes that will come through education of the hand. And so your theme and our theme are the same. Manual training is a plea, not for just one-sided education, but for an all-round, symmetrical education which recognizes that it must be given to a soul, to an intellect, to a mind, to a spirit that is resident in the body. All the faculties ought to be developed—and, friends, I might just as well stop here as anywhere. I am brimful of this gospel, not simply to talk it, but to work it; and I am one of those who believe that the State of California is better situated than any other State in the Union to make manual training a part of her educational system, solely because she realizes that it is her mission to raise, not only the best horses that are grown in the world, but also the sons and daughters that shall make the noblest men and purest women that the sun shines upon. As a means to this end, she must turn her attention to educating, not only the minds, not only drawing out and developing intellects, not only giving them mere lessons in preachment about ethics and morality, but also by remembering that if you make a man sick you make him a villain; that there is no kind of intellectual teaching or moral preaching or system of ethics that will make a safe citizenship unless it builds it upon sound bodily vigor; and this, I believe, so far as schools are concerned, can come only or largely through the incorporation of systematic educational gymnastics and educational, justifiable manual training into our systems; and I know this is never going to come through the endeavor solely of those who thoroughly comprehend the value of manual training, unless they have the reinforcement of a body of men who are

competent to speak upon it, and that is the physicians of this State of California.

I deem it a proud day in our history when we are able to look over this State and find money being diverted to these charities, to find that we have a Lick School; that some Californian had it in his heart to give the money for that, and that we have a Cogswell, a Wilmerding, and a Throop. And may their name be legion, and in a greater way may the name be legion of those who will see the necessity of providing these schools for the youth, not simply of a few sections, but of providing this opportunity in some degree for the many in every city and town throughout the State of California.

THE PRESIDENT: It is fortunate for us that we have a stenographic report of all of our proceedings; and, as your presiding officer, and as a member of your State Board of Health, it affords me pleasure to know that the address to which we have just listened will appear in full in our published transactions.

The next thing on the program is the "Report on Antitoxine."
That will be referred, as it is now a quarter to eleven.

REPORT ON DIPHTHERIA ANTITOXINE.

By DR. J. H. DAVISSON, President of the California State Board of Health.

It is not the purpose of this brief paper to discuss the various theories of immunity; nor to give the rationale of serum-therapy; nor, indeed, to enter the domain of the bacteriologist, but rather to deal with the business side of the question officially.

Prior to January, 1895, there had been but little diphtheria antitoxine used in California, for various and obvious reasons. It was an innovation in medicine, and a new and unfamiliar remedy, which was, for the most part, imported from Germany and France, as it was not prepared in America for the trade, except in New York in small quantities. From the nature of the remedy it was subject to changes incident to keeping and handling by those unfamiliar with it; and also subjected to extremes of temperature and decomposition in transit, to say nothing of imitations, etc. It was also a matter of commerce and, often, speculation—being sold at fabulous prices without any sort of security against dangers or failures due to the circumstances above mentioned. The introduction of 10 c.c., or two fluid drachms, of the serum of the horse, previously immunized with toxins of diphtheria, into a child by the hypodermic method, is, to say the least, heroic. Many cases of diphtheria are among the poor, as in poverty we generally have conditions favorable to its development and spread; and if the new remedy could have been had, who would volunteer to pay \$4 or \$5 per dose for it?

These and many other considerations induced us to formulate and propose a plan to overcome all these hindrances—believing it had passed the experimental stage—and thus place a remedy, which promised so much for the dread disease, within reach of all and deprived of the many uncertainties above mentioned. We proposed to take the business out of the hands of the trade and place it in the hands of the California State Board of Health; and at the January, 1895, meeting at Sacra-

mento our plan was adopted, and a bill prepared and presented to the State Legislature, then near the end of the session, asking for an appropriation of \$6,000 to procure or prepare diphtheria antitoxine for free distribution throughout the State for the next two years, under the direction of the State Board of Health. That the bill passed immediately attests the intelligence and humane character of the last Legislature. The bill was so worded that we might prepare antitoxine in one of the scientific departments of the State University at Berkeley; but, by the time we were in shape to use the appropriation, other plants or laboratories in this country began the preparation of the remedy, and although we have a Department of Biology and also a Veterinary Department and apparatus, yet we could purchase it of reliable laboratories cheaper than we could prepare it.

Thus the State of California was the first in the Union to take such advanced grounds on this important matter, and some time afterwards the classical State Board of Health of Massachusetts, which has done much for sanitary science, adopted our plan, except that the well-to-do are compelled to pay for the antitoxine. Later, the New York City Board of Health did likewise, and December 15, 1895, as diphtheria was prevalent in Brooklyn, N. Y., and on account of the fatality and the then limited use of antitoxine, the Board of Health, through its Commissioner, issued a circular to the profession of Brooklyn, agreeing to furnish antitoxine to those who would use it and make clinical returns of its use. Other cities now furnish it to dispensaries and the poor on similar conditions.

We divided the State into five districts for convenience of distribution, and established a depot of supply in each district, which is in full charge of the resident member of the State Board; and to facilitate its use, we purchased a dozen antitoxine syringes of the latest pattern, and placed several at the disposal of each depot, for the benefit of those who had no suitable syringe for antitoxine. Thus we have placed, gratis, reliable antitoxine at the disposal of every licensed physician of any school, and only require clinical returns of cases treated, that we may have statistics from our own physicians in our own State—as by many conservative physicians serum-therapy is yet considered *sub judice*.

The serum, which is, from its nature, perishable if not properly handled, can be kept almost indefinitely in cold storage, where we have been keeping it for more than a year, during which time we several times ran out of the fresh product, and then used up the old stock, which had been prepared for many months, with good results.

In looking backward over more than a year's trial of our plan, we are more than satisfied with results. Much of the prejudice against it has subsided, and physicians of all schools are using it; but, unfortunately, as yet there are no facilities or provisions for bacteriologic examinations by the State or by municipalities in California. We also regret to say that, although we have given this matter much time, and have spared no pains in giving detailed instructions in regard to antitoxine and its technique (and the Board has insisted on clinical reports), we have been disappointed that physicians have been so tardy in making prompt returns in so important a matter at this time.

Since the acceptance of this new remedy by most members of our profession, and the logic of "brutal figures" converted the renowned Virchow to antitoxine treatment, and notwithstanding the accumulated

statistics from reliable sources from almost every civilized country, there still remains much opposition among those less informed—as a rule; but almost every country is led on in the fight against it, by some eminent leader. Germany has its opponents, and still it furnishes remarkable statistics which attest its value. Perhaps the greatest exponent of the opposition to-day is Lennox Browne, of London, who has recently written a new book on "Diphtheria and its Associates," and has considered and condemned diphtheria antitoxine in an appendix. Among other things he says: "The reasons for considering this subject in an appendix hardly need detailed explanation. Serum treatment is said to be still on trial, and on this account, as well as in the facts to be recorded, we do not feel justified in giving it a position as an integral portion of the older, well-tried, and well-established methods of classical treatment of diphtheria." He contends that it does not reduce the death-rate, and declares that there are more fatal accidents, complications, and sequelæ than under other methods of treatment. The great English specialist hears an echo to his views and opinions from America in the person of Dr. Winters, and others equally well informed; but to me this is not as strange as to meet those who oppose vaccination as a protection against smallpox.

To look at the other side of the question, we are confronted with most convincing statistics. At the 1895 meeting of the British Medical Association, statistics were presented from the hospitals of England, Scotland, Munich, Berlin, and New York, showing uniform and great reduction of mortality under antitoxine. French statistics show 65.6 per cent decrease in mortality in the latter half of 1895, and that 15,000 lives are saved annually by serum-therapy. Berlin statistics give 4,391 patients in private practice, with a death-rate of 7.9 per cent; 1,442 in hospitals, with a death-rate of 14.6 per cent; total, 5,833, mortality (with antitoxine) 9.6 per cent. Welch, of Johns Hopkins University, has collected 7,166 cases (treated with antitoxine) from various sources, and shows a mortality of 17.3 per cent, as against 42 per cent under former methods of treatment. The Medical Record of March 7, 1896, reports 629 cases of diphtheria treated in Chicago with serum, with a mortality of 6 per cent, and none where injection was given within twenty-four hours of development; and of 437 persons immunized (after exposure), none of whom contracted the disease.

Most of the antitoxine used in California is made in this country; and after considerable investigation and trials of the German and French preparation, we are giving our preference to the American production; and most of the antitoxine used by the Board is from the laboratory of Parke, Davis & Co. The American product is put up in better form for transportation and handling, which of itself is an important item. The stronger preparations of antitoxine are the best, and the average curative dose is (when administered early) 1,000 units (Behring's standard), and in severe cases, or adults, or advanced cases, or croup, 1,500 units should be given; and these doses may be repeated every twelve to twenty-four hours till 5,000 or 6,000 units are given in a single case. Two hundred units is an average immunizing dose. The usual antiseptic precautions should be observed, and no more care is required in the administration of antitoxine than in other "up to date" procedures in medicine and surgery. The injection should be made under the skin in the cellular tissue, and not into the muscular tissue, and over the

chest, sides, or back, according to circumstances; but, the dose being large, there is often considerable reaction and soreness at the site of the injection, which interferes with movements or handling for a day or two. For immunizing, an ordinary hypodermic syringe may be used, and the deltoid region is best, as it ordinarily is, for all injections for any purpose.

Kitisato has long since used and commends a much stronger serum than has been in general use; and it does seem desirable to diminish the amount of the horse serum, as it is irritating; and by giving 5 c.c. of a stronger antitoxine, rather than 10 c.c., as now in general use, the best result is obtained.

The New York City Board of Health issued a circular, February 11, 1896, stating that "as a result of investigations in the bacteriological laboratory, they had improved on former methods of production of antitoxine," and are now prepared to supply five grades of diphtheria antitoxine for use (in the city), as follows:

No. 3,	vials 10 c.c.,	1,500 units (Behring's Standard).
No. 3A,	vials 5 c.c.,	750 units (Behring's Standard).
No. 4,	vials 5 c.c.,	1,000 units (Behring's Standard).
No. 5,	vials 5 c.c.,	1,500 units (Behring's Standard).
No. 6,	vials 5 c.c.,	2,000 units (Behring's Standard).

The bacteriological laboratory of Parke, Davis & Co. has been working independently on the same lines, and is now prepared to furnish much stronger serum. March 14th they bled six horses, which had been pushed for the purpose, and a careful test showed the following results:

Horse No. 1,	10 c.c.,	2,500 units (Behring's Standard).
Horse No. 3,	10 c.c.,	2,000 units (Behring's Standard).
Horse No. 5,	10 c.c.,	3,000 units (Behring's Standard).
Horse No. 10,	10 c.c.,	2,000 units (Behring's Standard).
Horse No. 15,	10 c.c.,	1,000 units (Behring's Standard).
Horse No. 20,	10 c.c.,	1,000 units (Behring's Standard).

Thus, 5 c.c. of No. 1 is 1,250 units; 5 c.c. of No. 3 is 1,000 units; 5 c.c. of No. 5 is 1,500 units; which gives a strong serum with a minimum dose.

After again pushing the injections of toxine, the same six horses were again bled April 7, 1896, with a view of preparing a stronger serum.

They also "experimented with a view of finding out what a mixture of the different serums will yield; whether we can expect to get, in 10 c.c. of a mixture of the serums taken from these, an antitoxine which will be stronger in proportion to the individual strength of each serum tested." We are promised a few bottles of this stronger serum from Parke, Davis & Co., in 5 c.c. vials, with a view of testing the same.

Roux, in his work at the Children's Hospital, in Paris, found most of the fatal cases, or failures of antitoxine, due to mixed infection; mortality being 7.5 per cent in cases where the diphtheria bacillus was found alone, as against 34 per cent when associated with streptococci; hence, the double antitoxine is now offered by the New York Pasteur and Vaccinal Institute, which requires a year's time to immunize the horse against the streptococcus.

Stokes (in the Boston Medical and Surgical Journal) states that "bacteriologic examinations of nine fatal (apparently) uncomplicated cases of diphtheria treated with antitoxine disclosed the streptococcus in the liver, spleen, kidney, and heart's blood in five; in one in the

spleen. The pneumococcus was found twice in the kidney, and one of these streptococci was in the spleen; in one case, the bacillus coli communis only. In the lungs of all were found the bacillus of diphtheria, streptococci, pneumococci, and staphylococcus pyogenes aureus, either alone or in combination. The bacillus diphtheria was found in the kidneys in four, and once in the heart, and once in the spleen."

There has been expended in the distribution of antitoxine throughout the State, \$1,451 69, and we have about \$100 worth of antitoxine on hand at the five stations. The Los Angeles depot has distributed 284 bottles of diphtheria antitoxine—17 vials of the German preparation and 267 from Parke, Davis & Co., all of 10 c.c. to the vial; 86 vials of 600 units; 125 of 1,000 units; and 73 vials of 1,500 units (Behring's standard). We have received clinical reports from more than fifty physicians who have used antitoxine in California—most of these from the Los Angeles district, where diphtheria antitoxine is more generally used than in any other section of the State. Although we had hoped to be able to give complete statistics, yet these reports indicate the great value of the remedy, as it has been uniformly successful for immunizing, and there have been no deaths where antitoxine was used within twenty-four or thirty-six hours, and the three or four deaths reported have occurred in cases where the antitoxine was not used for four or five days, to even ten days. A single dose was given in a large majority of cases, and if given early it is sufficient; but I have given 5,000 units in a single case, where the disease had been running five days, with good recovery, excepting slight paralysis, which soon disappeared without treatment. In many cases the use of antitoxine is followed within a week with urticaria, which is uncomfortable, but soon subsides, even without treatment.

In considerable personal experience with, and observation of, its use, I have seen no accidents nor bad results from the use of diphtheria antitoxine, and would advise its universal use, both for immunizing and for treatment.

DR. W. F. SOUTHARD, of San Francisco: There is one word that ought to be said in regard to this address which has just been given us by Professor Keyes, and it is this: That in the first place, the Society ought to pass a vote of thanks, because it is a subject that ought to come home to us all, this very line of thought which the Professor has given us. Preventive medicine, which this Society is engaged in, is one of the most glorious things connected with medicine. It beats all the prescribing of drugs that can be dreamed of, and to prevent disease is a great thing. The future of our race, the future of our country, depends upon how we shall bring up the children, the boys and girls, and bring them up correctly.

I have had the privilege of meeting teachers in this section quite a number of times, and I know the interest which they have taken in all these subjects, and every year it becomes more and more apparent that there is a closer connection being brought about between the educators on the one side and the physicians upon the other; that they are looking to the physicians to give them a certain amount of knowledge which will help them in their work, and we are looking to them to show us more about the mental development of children, and so on. I think that all this should be taken into consideration by the physicians; that

these subjects are so mingled that you can't separate one from the other and let it stand out as an entity by itself.

The progress which has taken place is very remarkable, and any one who feels a little discouraged, I think if he will let his mind go back a few years can take courage. I remember myself that about twenty-three years ago I attempted to find some books on the subject of hygiene, and I ransacked the largest book-stores in Boston, and sent to New York, and but one copy of any work treating exclusively of hygiene in any way, shape, or manner, could be gotten, and that was an English book which at that time was out of print. It was a very small book of probably one hundred and fifty or two hundred pages. Within the last twenty years the subject has become so wonderfully broadened that everybody has taken an interest in it from various points of view, and now we have at least half a dozen journals devoted entirely to different branches of dietetics and various things—hygiene and all that sort of thing—and a number of volumes have been written on different subjects; and for that reason it is that we can take courage for the future in looking back over the last ten or fifteen years.

I think, in the might of the magnificent address which has been given us, which will give us a great deal of food to think about when we go home, that it would well become us to give a vote of thanks for this admirable address.

(Motion made, seconded, and carried unanimously.)

ANTHRAX, AND ITS SANITARY RELATIONS.

By R. T. WHITTLESEY, D.V.S., of Los Angeles.

Bacteridian anthrax is the most ancient infectious disease of animals that is known. Moses, in the book of Exodus, speaks of a murrain that affected all the animals of the Egyptians of whatever kind.

Diseases spoken of by Homer, Plutarch, Dionysius, and others of the old writers, were probably no other than anthrax.

Lucretia (428 B. C.) designated it *ignis sacer*; Columella gave it the name of malignant pustule. Virgil described a disease of the sheep, which was transmitted to man by contact of furs, wool, and cadavers, and produced in the integument ulcerating lesions, which extended to the muscles.

The Arabians knew it under the name of Persian fire. Mezenay (966 A. D.) called it St. Anthony's fire.

In the latter part of the fifteenth century, the Senate of Venice prohibited, under penalty of capital punishment, the offering for sale of any meat coming from cattle with anthrax.

In 1617, Athanasius Kischner gave the description of a disease of the bovines, which was transmissible to man, and which killed sixty thousand people.

It is first noted in Germany and Hungary in 1712; in Poland, Silesia, and Saxony, in 1726; in France, in 1731. It invaded Franconia in 1755 to 1761; Finland and Russia, 1758 and 1759; Guadeloupe, 1774.

Chabert, in 1780, has shown that the different forms of anthrax constitute one and the same disease. Kausch, in 1805, gave a good description, but did not recognize its contagiousness.

Anthrax of sheep was well studied by Delaford and Gerlach in 1845; and while Delaford did not believe in its contagiousness, Gerlach demonstrated it experimentally.

In 1850, Heussinger published a work on anthrax, in which he considers it a malarial neurosis. In 1855, Pollinder announced that he had found in the blood of bovines affected with anthrax a quantity of little sticks; these were seen by Davaine in 1850, and Dorpat in 1857. Cohn was the first who considered the little sticks bacilli, and suspected their sporification.

Koch has enlightened us upon the development of spores and their transformation into bacilli.

Preventive inoculation was discovered by Toussaint, and later matured by Pasteur.

The bacteria appear in the living organism, in the form of straight rods, cylindrical and immobile, the extremities distinctly marked, and, in general, their length is about double the diameter of a red-blood corpuscle. They are found in all the tissues of cadavers affected by anthrax, but are more plentiful in the spleen.

The biology of anthrax I shall not go into, as it would take a paper many times my limit, and can readily be found in many text-books. And I wish to give you information, derived from many sources, not readily attainable by the practicing physician.

Anthrax is most common in the ox and sheep; the carnivora are rarely affected.

In relation to their susceptibility, animals may be classified in the following order: ox, sheep, goat, horse, stag, antelope, deer, and camel. Certain sheep in Algiers are completely immune from any inoculation with anthrax. Pasteur made many experiments, trying to convey this immunity by breeding and various other ways, but all were failures.

Fish and amphibia are hardly affected by it. Well-fed animals are predisposed to it. Newly imported animals are more susceptible than acclimated subjects. A first infection confers partial immunity.

Anthrax is very prevalent throughout Great Britain; in Scotland, it is called Braxy, and I am informed that the Highlanders eat sheep dead from it, with impunity.

From the report of the Veterinary Department of Great Britain, I copy the following: "From remote times anthrax must have existed in this kingdom, but no restrictive measures were adopted until 1886, when it came under the provisions of the Contagious Diseases Acts. Of the origin of anthrax nothing is known, but of its antiquity no doubt can be entertained, and there is nothing to justify a hope that it will ever be extinguished." In 1886 strict measures were adopted regulating the movements of animals from premises on which anthrax had broken out, the cleansing of the premises, and the disposal of the carcasses. It says further, that, "So far as it is possible to judge from returns of cases of anthrax in farm stock, the regulations which have been in force since 1886 have done little or nothing to check the disease. In fact, in 1892 we had a larger number of counties affected and considerably more animals attacked than at any period since 1886." In 1892 a slaughtering ordinance was adopted, and in the instructions to local authorities, occurs the following important item: "Avoid, as far as possible, effusion of blood in slaughtering diseased animals, or when providing for the destruction of their carcasses; burial of uncut carcasses with a sufficient

covering of quicklime is the most simple and effective method of disposing of them. The organisms soon die when access of air is prevented, but when the carcasses are destroyed by burning or boiling it is generally necessary to cut them in pieces, which is not only dangerous to the persons employed, but also is calculated to spread the disease, unless the utmost precaution is observed."

The first outbreak in Australia occurred in Cumberland County, New South Wales, from which it took the name it is now known by throughout Australia, "the Cumberland disease." The ravages became so great that a commission was appointed in 1851 to investigate its nature. In 1888, Pasteur's agents went to Australia to deal with the rabbit plague, and were induced to investigate the disease. An attenuated virus was procured, and a number of public and official experiments were made upon sheep. After giving the subject the fullest consideration, the official board reported that they were unanimously of the opinion that the efficacy of Pasteur's vaccine of anthrax as a preventive against the disease had been demonstrated, and they recommended its adoption and use.

In the United States, the disease exists in nearly all parts, to a greater or less degree.

In the report of the Committee on Diseases, read before the United States Veterinary Medical Association last year, anthrax was reported from nearly every State and Territory.

In August, 1892, an outbreak occurred in Delaware that was very mysterious in its origin, as it was on farms where it had never been known before, and situated on the highest land in that section of the State. During the outbreak ten farms were affected; forty cattle and nine horses died, and four men contracted the disease, but recovered. The Delaware Experiment Station investigated the cause, and came to the conclusion that it had been caused in a most peculiar way.

Goat-skins are imported from South America, South Africa, Asia, and other countries by the Morocco tanneries. The farmers for several years have been impressed with the value of the hair and scrapings from the tanneries, as a fertilizer, and the supposition is that in that way the anthrax germs were spread on the soil, and in one instance these germs were believed to have been carried for over a mile on the boots of a farmer, who had been helping a neighbor examine a dead animal.

In 1895, an outbreak occurred in New Jersey that is supposed to have originated from some of the cattle having been thrown into the bay and floated across to the Jersey side. In this New Jersey outbreak Pasteur's vaccine was used, and of its efficacy Dr. Tremain writes, that on farms where they had been rapidly dying, he inoculated one hundred and seventy-six horses, one hundred and fifty-two cattle, and fourteen mules; and of this number only three died after the first injection, and only one after the second. A little later, by State authority, one thousand two hundred and twenty-seven horses, cattle, and mules were inoculated, with satisfactory results. The State furnished the vaccine, but the vaccination was optional with the owners.

It has been stated that anthrax was introduced into Southern California from France, but after diligent inquiry among the old settlers, I have been unable to verify it. The first outbreak in these parts was in a band of about three hundred sheep, belonging to a man by the name of Myers, near the San Fernando Mission; they nearly all died. That was in 1878 or 1879. The first person to die was a Mrs. Donalechi, in

the same neighborhood, and a year or two later. The sheep on the same ranch were rapidly dying at that time. This woman was probably inoculated by a fly, as the pustule was on the upper part of her breast. At the time, she was supposed by her neighbors to have erysipelas. From there it seems to have spread to nearly all parts of Los Angeles County, although it was several years after this before the first sheep were imported from France by Judge Amestoy, who lived about ten miles south of this city, and the disease did not make its appearance on that ranch until many years later; but sheep-raising has now been abandoned there almost entirely. The last, a band of one thousand four hundred, were divided, one half being sent to the Encino, about thirty miles from here, in the San Fernando Valley; all that were left on the home ranch died, while the mortality in those driven away was no greater than usual.

On this Encino ranch, which has been a very extensive sheep ranch, I am informed by the owners that men very frequently have charbon, as they call it (from fly bites), but the sheep seldom. In the foothills are some sulphur springs, and sheep brought to the ranch, if watered at these springs, do not have it; but if taken to the lower part of the ranch they do; and that sheep raised on the ranch at the springs can go to the lower lands with little danger; all of this they attribute to the medicinal effect of the sulphur water.

Three years ago an outbreak occurred on the Hammel & Denker ranch, between this city and Santa Monica, in which forty-two head of cattle died in about two weeks. These cattle, about three hundred head, of all ages, had been driven on to dry stubble, and were watered at an old reservoir, which was dry most of the year, except when filled for this purpose. They were there only a week or ten days before commencing to die; they were brought back, but deaths continued between two and three weeks. The exciting cause being removed, the disease naturally wore itself out; but the checking of the outbreak was attributed, by Mr. Denker, to entirely different reasons. He had a receipt for a vaccinating compound, that he paid some man \$300 for a few years before, and he had a large quantity mixed and diligently used, and there were only a few died afterward. The *modus operandi* was very interesting: An animal was caught and made fast, an incision was made between the digits with a knife, after which the mixture was shaken into the wound out of a peppercorn bottle. Mr. Denker declared to the day of his death that that \$300 was one of the best investments he had ever made.

Malignant pustule, the external anthrax disease of man, is very common in this part of the State, Dr. Nadeau having treated cases up in the hundreds; he having a large practice among the Basque sheepmen.

Dr. McGowan has treated many cases, and in 1892 read a very exhaustive paper on malignant pustule before the Southern California Medical Association; reprints of which he has lately had printed, after much solicitation.

The sheepmen are very quick to know a case of charbon on themselves, and do not delay its treatment. Some treat it with scarifications and turpentine, and garlic poultices, when on their hands, where it seems to most often occur. I saw four men at one time on a ranch, last year, with small charbon sores on their fingers, and they did not seem

to be at all afraid of the results, and were treating them in their own way.

The germs of anthrax are with us to stay; man is in danger from the dead carcasses of animals and their products, either by handling or through the instrumentality of flies. So it behooves the sanitarian, as far as possible, to prevent the disease in animals, and thoroughly destroy the bodies when dead.

Fire, or deep burial without mutilation, is the best method of destruction, and so far as our present knowledge goes, inoculation with lymph, after Pasteur's method, is the best preventive.

The greatest drawback is the procuring of fresh vaccine virus, the nearest place that it can be procured being New York. It has been suggested by Dr. J. H. Davisson, of the State Board of Health, that if it was placed in cold storage, it might be kept indefinitely. There are cold rooms in this city that are kept from 12° to 18°, and it certainly would be advisable, in all counties where anthrax is prevalent, for the Supervisors to keep a limited amount of the weaker vaccine for first inoculation; the second inoculation takes place in twelve days, allowing plenty of time to procure it from the laboratories in the East.

THE PRESIDENT: Permit me, on the part of the State Board of Health, to thank you, gentlemen and ladies, for your attendance and attention at this convention.

Adjourned.

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